September 10, 1945

STEEL

The Magazine of Metalworking and Metalproducing

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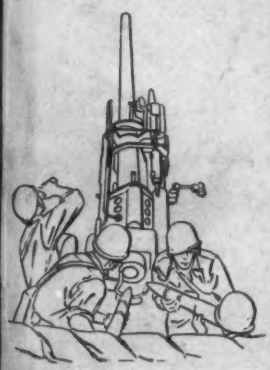
TECHNOLOGY D



Mesta 18"—14" Merchant Mills with Pack Annealing Cooling Bed and Equipment

he Army-Navy "E" Flag with five stars s over the Mesta Plant

Rolling Stock for 90-mm. Anti-Aircraft Shells at KAISER COMPANY, Inc.
IRON AND STEEL DIV., FONTANA, CALIF.

MESTA MACHINE CO.
PITTSBURGH, PA.

Heald experience in solving thousands of problems—points the way to your best answer

A method we devised for precision grinding 200 bearing races an hour, is utilized in solving the problem of finishing engine sleeves 6 times faster. Meeting the need for more accurate production in Detroit points the way to faster production for a customer in Toledo. And so it goes . . .

The point is—in meeting an endless variety of precision finishing problems, Heald has built up a wealth of "know-how" upon which you can draw. In the Heald vaults are literally tens of thousands of case histories—including ingenious methods of tooling, holding work, utilizing indexing fixtures and cross-slides—one or more of which can be engineered into a machine to finish *your* parts faster and at less cost.

Now, before you get embroiled in the fast approaching hectic competitive battles, why not price-mark your production for waiting peace-time markets. Scrutinize operations in your plant in the light of what Heald Precisioneering can help you achieve. A Heald Engineer will be glad to work along with you.

THE HEALD MACHINE COMPANY
WORCESTER 6, MASS.

More Precision · Less Cost **HEALD**

INTERNAL AND SURFACE GRINDING MACHINES • BORE-MATIC PRECISION FINISHING MACHINES

TECHNOLOGY DEPT.

SEE BETHLEHEM

With loads on the increase, modern cranes need wheels with adequate strength and wear-resistance.

Bethlehem's rolled and forged crane wheels have the ruggedness, the margin of reserve, that is imperative in heavy-duty service. They are made by a unique, exclusive process that assures uniform metal density; that actually "builds in" strength and durability.

We furnish a complete line of crane wheels (with tread diameters ranging from 10 to 37 inches), suitable for all types and capacities. They are supplied rough-machined, finished-machined, untreated or heat-treated. The advantages of these wheels merit thorough study by your designers and engineers. At your convenience, a Bethlehem man will be glad to furnish full details.

Address your inquiries to Bethlehem Steel Company, Bethlehem, Pa., or nearest District Office.

Bethlehem Also Makes

Blanks for Spur, Bevel, Mitre, and other types of gears

Bevel Rollers Turbine Wheels
Sheave Wheels

These rolled and forged circular products are furnished rough-machined, which means less finishing work for the customer. They can be supplied heat-treated or untreated; of alloy or carbon steel.

★ BETHLEHEM STEEL ★

MULTIPLY OUTPUT

As this small air-operated bench rammer dances rapidly over the foundry mold, tamping the sand firmly into place, it is really multiplying output. More work is produced with less effort and the uniform blows of the tamper produce a higher quality job.

There are several factors that make this possible...To begin with fatigue is reduced to a minimum because the lightweight rammer, not the man, does the work. The easy-holding qualities of this air tool, combined with positive throttle control, enable him to do the tamping quickly and get on with the rest of the operation.

In addition to multiplying your tamping output,* I-R Air Tools are available to help you do the same thing with many other operations such as — drilling, reaming, riveting, chipping, scaling, hoisting, digging, nut-running, etc. Whether the job is large or small, we have an Air Tool for it. Ask one of our Service Engineers to help you make a selection.

**The I-R line also includes floor rammers and backfill tampers.*

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

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COMPRESSORS · CONDENSERS · TURBO BLOWERS · CENTRIFUGAL PUMPS · ROCK DRILLS · AIR TOOLS · OIL AND GAS ENGINES

Here comes a blue star turned into a blue chip

THE sooner those boys step off your service flag (or someone else's) into your business, the sooner you're going to have a new lift, unlike anything you've felt for years.

Employee training? They're the finished products of the greatest program of finding and developing skills this world ever saw.

Morale getting a little low around the place? A few of these lads with their eagerness to get back and get ahead will snap it up in a hurry.

Discipline a little lax? These boys are the essence of discipline at its best. And they'll *keep* it, because they know they could not coast on their war jobs—they must *progress* on their peace jobs.

There are men with practically every skill you could possibly want, *and we mean skill.* Those skills are good enough to lick the toughest job the world ever saw. Use them to help you lick the business problems ahead.

These men are blue chips.

Published in cooperation with the War Advertising Council with the gratitude and pride all Americans feel for our fighting men —by The B. F. Goodrich Company.

BEHIND THE SCENES

Chicken Feathers

■ Apparently you ain't seen nothin' yet in this postwar glamour world until you slide into a new suit made from chicken feathers. Yep, that's what we said—*chicken feathers*. The research lab of the U. S. Rubber Co. has developed the new fabric which looks like wool, but is warmer, softer and lighter in weight. It is odorless, can be laundered in soap and water, and can be dyed any color.

B. H. Foster, manager of the textile section of the company's general laboratories, was inspired to go to work on the problem when he discovered that there are 100 million pounds of chicken feathers and 30 million pounds of turkey feathers going to waste in the United States every year. And, as you can well imagine this is a very ticklish situation. Furthermore, it would only take the feathers of 38 broilers to make you up a really elegant zoot suit with a completely draped shape. Personally we're going to get ourselves a pair of snappy Rhode Island Red slacks and a Plymouth Rock sport jacket to match.

He's a Winnah!

■ STEEL's readers are where you find them, and we discovered a new one in the mail this week. A. H. Fisher, Acr M 3/c writes in from the middle of the Philippines, of all places, to say how much he enjoys this page each week and how avidly he reads the rest of the paper as well. The main purpose of his letter was to take a crack at that Brain Twister which appeared here in June on the nine coins. Of course it may be that he was thinking of some strange far eastern coins but his answer doesn't quite work out. Nevertheless, any guy who's still in the middle of the Philippines deserves the prize whether or no, and his copy of the Welding Handbook is now on its way.

Electronic Magic

■ One of the outstanding jobs of explaining and illustrating a highly technical subject that we have seen lately is the booklet prepared by the American Air Filter Co., Louisville, on the "Magic of Electronics in Air Filtration." You may want to hit them for a copy, both for the subject itself and the way in which it is handled.

After Hours!

■ We always enjoy reading the little piece that Lindberg Steel Treating Co., Chicago, puts out called "After Hours," but the editor really went down the pike in the last issue. He got himself all tangled up in a copy of one of the plushy fashion magazines, only to be completely bewildered by such talk as, "If you think a skirt or two you love, and a shirt or two, a jacket with real pizazz (sic), a ditto belt, and slap-happy hand at throwing them together are the secrets of a well-dressed woman, you're of the moment." Struggling on, he discovered that as of this issue, "Pink Garter" was "news for fingertips and lips," an appealing plea in behalf of "the lift that never lets you down," and some gloves which offered "Earth's laughter caught in your hands."

How he ever did it we'll never know, but somehow he sneaks out at the end by getting back to the machines that turn all this stuff out and even finally to the steel treating business. If you don't get "After Hours" you'd better get on the list.

Postwar Optimism

■ During the war we made a lot of studies aimed at finding out just how shiny and bright the postwar world was really going to be. Some of the results we arrived at after a careful perusal of these studies were so optimistic that some of the conservative folks around this printshop scoffed at them, saying that they were only wishful thinking on the part of the metalworking executives who gave us the data. Now that the postwar world has really arrived, we have been looking back at some of the studies and their conclusions, and comparing them with conditions as they really are.

We're pleased to say that most of our wartime stuff was in reality a little on the conservative side, if anything. Reports from manufacturers of steel mill equipment, for example, indicate big backlogs of orders for mill equipment and auxiliary items. The index of foundry equipment which we publish in our Business Trend section every month now shows a higher volume of unfilled orders than during the war years. We feel quite happy about the whole thing.

Nylons

■ On a jaunt this past week we really got behind the scenes of the nylon hosiery situation, when we stopped off in Reading, Pa., for a couple of days. On a conducted tour of the city, we had a chance to sneak up to within a stone's throw of a full-fashioned knitting machine zipping along at full steam and turning out those things that make the little woman swoon. Unfortunately the well-armed plant guard saw us just about the same time that we saw the pile of nine and a halfs, so we emphatically report no luck.

More Copies

■ Today, with new technical developments coming through by the bushel and news on reconversion and the return to peacetime production as eagerly looked for in each Monday's issue of STEEL as the latest strip on Joe Palooka, you'll be happy to know that as a result of the lifting of paper restriction, we are now able to deliver more copies of STEEL than at any time in lo these past 63 years.

Electrolytic Polishing

■ Polishing of metals electrolytically has been a subject of intriguing interest to technical men for the past couple of years. For the latest low-down on the subject, just turn to page 104 of this issue. It was written by an expert who also was in on the atomic bomb. Maybe he can tell you one of these days how new knowledge about the atom will revolutionize metallurgy.

SHRDLU

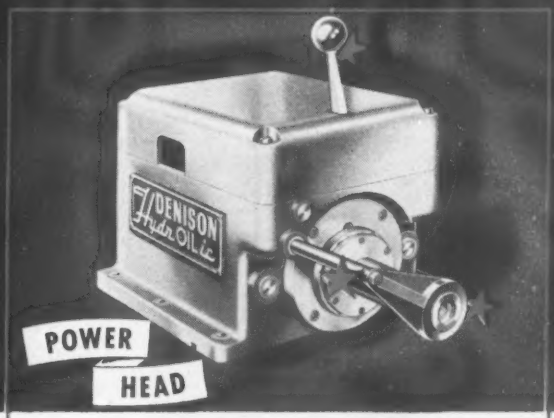
Vol. 117, No. 11, Sept. 10, 1945, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

Editorial Contents—Page 69

NOW - YOU CAN HAVE *Hydraulic Action* FOR YOUR *Special Jobs* WITH THESE STANDARD UNITS!

PUMP UNIT

★ELECTRIC MOTOR ★OIL RESERVOIR ★PRESSURE REGULATOR

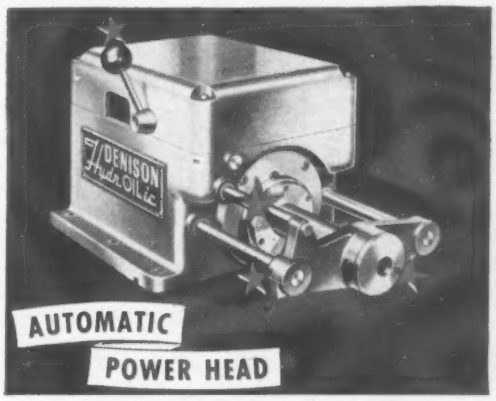


POWER HEAD

★ THROTTLE-ACTION CONTROL LEVER
★ PRECISION COUPLING DEVICE
★ STROKE-LIMITING SHIPPER ROD

Here is *Standardized* Hydraulic Power! Two compact and fully self-contained assemblies—Pump Unit and Power Head—providing 4 or 6 tons of "packaged" hydraulic action or pressure for your production engineers to easily and economically build into your special machines for unusual production tasks.

The Pump Unit includes electric motor, hydraulic pump, oil reservoir, and pressure regulating valve; and can be located at any convenient point. The Power Head incorporates fully-enclosed hydraulic cylinder, control valve, control lever, and the drive element (ram) which has a precision-type coupling device for attaching tools or the driven element. Length of ram strokes can be regulated anywhere between 1/32-inch and 6 inches. Ram pressures may be closely limited anywhere between 300 pounds and 4 or 6 tons. The Power Head can be positioned vertically, horizontally, or at any angle to suit the job. Two styles of these power heads are shown here: one with throttle-action control for feather-touch acceleration and deceleration of ram movement, and rapid or gradual increase and decrease of ram pressures; the other for automatic ram action, under which idling, single cycle, continuous cycling, dwell, and emergency reverse ram actions are available at a touch of the control lever. Still other Power Heads offer the revolutionary new Vibratory HydrOILic Pressure principle; rapid ram traverse and adjustable pressing speed; automatically repeated strokes of uniform pressure . . . and even a combination of *all* those actions. *Write today for full information on these standard Multi-Units!*



AUTOMATIC POWER HEAD

★ 5-POSITION CONTROL LEVER
★ STROKE-LIMITING SHIPPER ROD
★ TELESCOPING RAM GUIDES
★ PRECISION COUPLING DEVICE

The DENISON Engineering Co., 1163 Dublin Rd., Columbus 16, Ohio

DENISON EQUIPMENT for APPLIED HydrOILics

HydrOILics INDUSTRY'S RIGHT HAND

Allis-Chalmers Electronic H

NEW KIND OF A

Compare Engineering: A-C's years of industrial electronic experience give you superior operating features.

CONVENIENCE, economy, low cost — the magic of induction heating at its finest — that's what Allis-Chalmers new Electronic Heater now offers you!

Completely Automatic: Pre-set timer controls heat sequence from 2/10 seconds to 2 minutes — so that even unskilled operators can harden and braze metal parts in volume — uniformly — at simple touch of starter button. All controls are located on one panel for easy change in applications. Job settings are protected from tampering by door and lock.

High Efficiency: 3-phase rectifying system guarantees maximum power from Electronic Heater, prevents unbalanced load on power lines. All tubes carry manufacturer's guarantee (minimum: 1000 hours), often have useful life in excess of 5000 hours. New coupling system keeps losses low, permits adaptation to most applications without use of radio frequency tranformers.

Safety Features: Operator and equipment are fully protected by heavy-duty control, fuses, high water-temperature relay, interlocking switches on door, choke coil, water filters and pressure switches.

Maybe your manufacturing operation can be performed better, faster, cheaper with this great new production tool. Write for further information, or send samples for free laboratory test. No obligation. ALLIS-CHALMERS, ELECTRONIC DEVICES SECTION, MILWAUKEE 1, WISCONSIN. A 1914

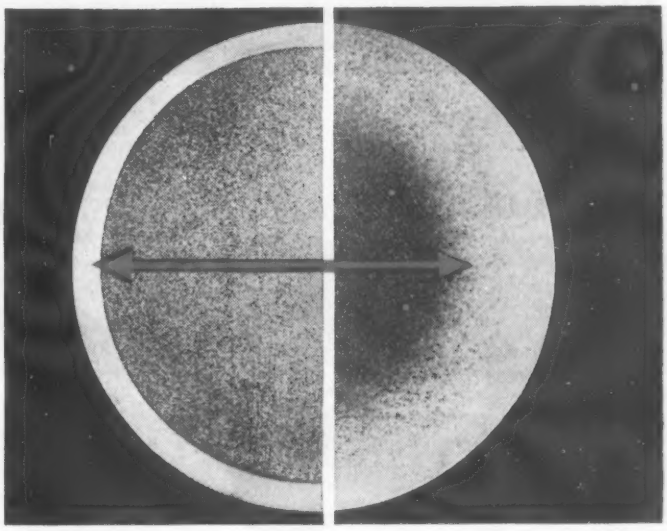
Pioneer Builders of Electronic Equipment for Industry.

Allis A-C

Heater Now Offers You A

METAL MAGIC

Compare Results: High frequencies, accurate control of A-C's new unit give you finer products at lower costs.



INCREASES PRODUCTION

Joining parts by brazing is ideal for induction heating — an application of this new magic process which can slash product costs by doubling and redoubling production rates! Here's how A-C's Electronic Heater solved the problems of one lubricator manufacturer who formed sub-assemblies by torch-brazing. His rejects were high, his production was slow (15-20 units per hour), and slow heat affected cadmium plating on parts so that it peeled off in a short time. A-C's Electronic Heater was able to step production up to 200 units per hour! Rejects became negligible, and plating was not affected. Maybe Allis-Chalmers Electronic Heater can show you the same spectacular results!

MORE EFFICIENT HARDENING

Allis-Chalmers Electronic Heater gives you surface hardening to controlled depths — faster, cleaner, without heat, fumes, space-waste of conventional methods. Tendency of high-frequency currents (400,000 cycles and up) is to hug surface of conductor. Result: thin, hardened surface with healthy, ductile core — as shown above, left, in unretouched microphotograph section of ¾ inch bar of SAE 1045 steel — hardened by Electronic Heater. Compare this with microphotograph section of ¾ inch SAE 1045 steel bar hardened by conventional methods — above, right! Here, uncontrolled hardening has penetrated deep into the core, making the bar brittle and weak.

Chalmers MILWAUKEE WISCONSIN

A GREAT STEEL FOR "STRUCTURALS IN MOTION"

N-A-X HIGH-TENSILE STEEL

N-A-X High-Tensile Steel is available in structural shapes and special sections to serve varied equipment-producing industries. Wherever applications can benefit by reduced dead-weight and extended life, N-A-X High-Tensile Steel provides the fundamental design advantages of great strength, excellent weldability, high resistance to impact, fatigue and corrosion, and exceptional "stability" of the metal.

- ANGLES
- CHANNELS
- I-BEAMS (*Standard and Wide Flange*)
- BULB ANGLES
- CAR-BUILDING AND SHIPBUILDING SHAPES
- CENTER SILLS
- SPECIAL SECTIONS

ITS FINER GRAIN MAKES ALL THE DIFFERENCE

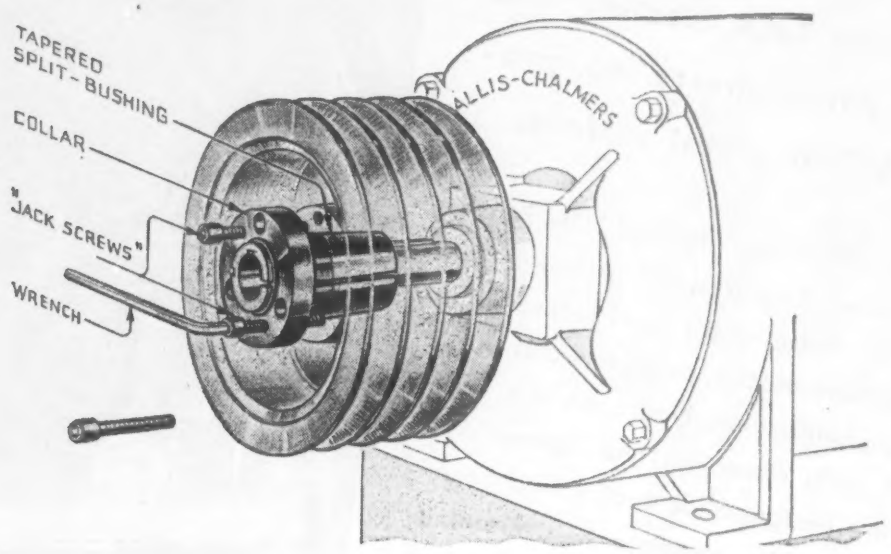
WEIRTON STEEL CO.

WEIRTON, WEST VIRGINIA • SALES OFFICES IN PRINCIPAL CITIES

UNIT OF NATIONAL STEEL CORPORATION

X-Ray View

OF ALLIS-CHALMERS' NEW "MAGIC-GRIP" SHEAVE



Fastest mounting and demounting sheave on the market, the new "Magic-Grip" costs you nothing extra.

1 **Remove three capscrews** from bushing collar. A handy wrench — supplied with each sheave — is the only tool needed to remove Allis-Chalmers' new "Magic-Grip" from motor or machine shaft quickly and easily.

2 **Insert two capscrews** in tapped holes. As screws are turned, they become levers . . . automatically breaking tight grip of tapered split bushing on sheave and shaft. Entire unit is then ready for removal.

3 **Remove sheave from shaft.** Requires no mallet, no prying, no bulging muscles. You just slide the sheave off . . . smoothly, quickly. *It costs nothing extra!* Send for B6310. Allis-Chalmers, Milwaukee 1, Wis.

A 1770

Allis-Chalmers Texrope

"MAGIC-GRIP" SHEAVES

Continuous ANNEALING Gas

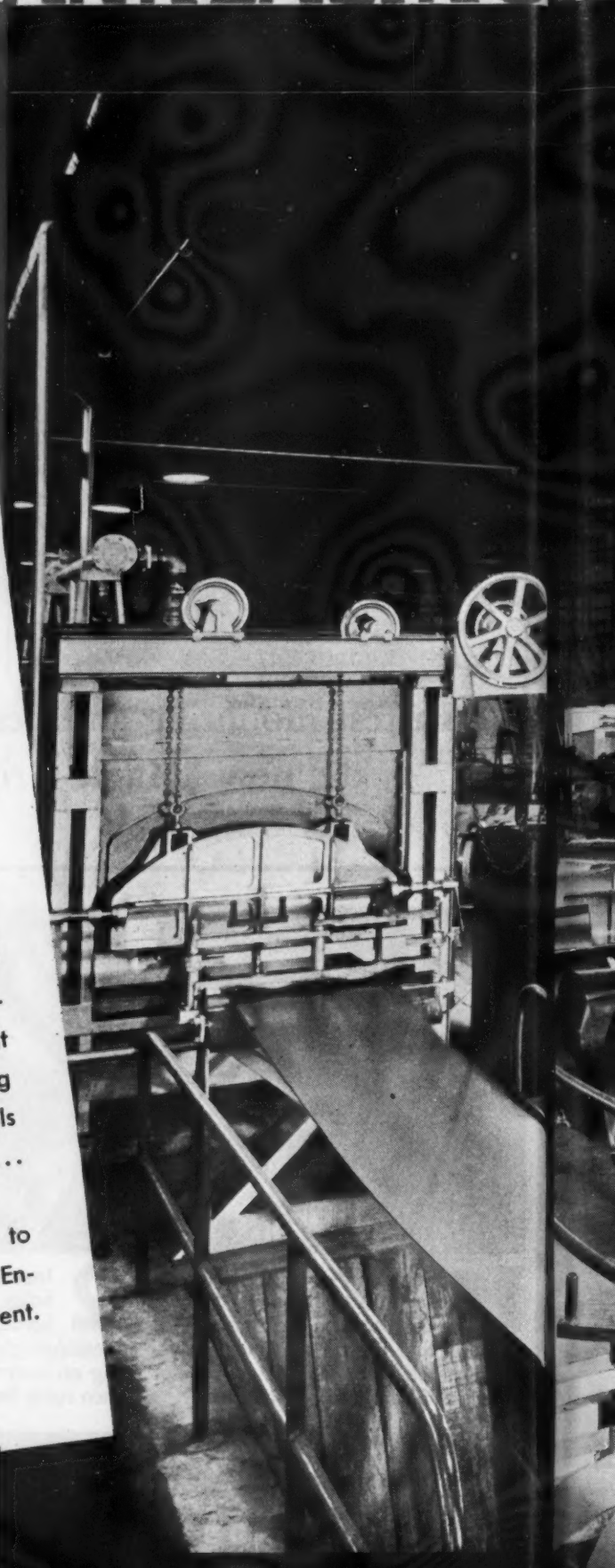
"Surface" Roller Hearth Furnaces utilize Radiant Tube Heating and Controlled Atmospheres to provide a bright metal surface.

For many years "Surface" Radiant Tube Heating and "Surface" Prepared Gas Atmospheres have been the choice of the steel industry for the heat treatment of strip, sheet, rod and wire.

In the accompanying illustration the continuous-type Strip Annealing and Normalizing furnaces were designed for quality and quantity production. The complete heat treating cycle . . . heating, cooling and quenching takes place within each furnace, in successive steps, providing for close operating control.

Whatever the production requirement—continuous or batch operation, "Surface" has many modern developments including the Radiant Tube and a broad background of research in the Science of Gas Chemistry and Heat Treating, to apply to the engineering of advanced heating and heat treating equipment for the specific job. With improved handling mechanisms, all these combined scientific tools have resulted in closer metallurgical control . . . greater capacities, and increased tonnage.

Wherever heat is used—from the ingot to finished product, it pays to consult "Surface" Engineers about modern methods and equipment.



'Surface'

SURFACE COMBUSTION
TOLEDO 1, OHIO

Gand NORMALIZING of STRIP

It's *Your* guess

UNITED

against 130,000,000

After the war, what?

What kind of a car will satisfy a bomber pilot? Will a jeep driver take four-wheel drive for granted on the truck he handles? The homes of tomorrow—what will they be like? Or the new radios, cameras, washing machines, stoves and refrigerators?

Millions of eager buyers are already dreaming about the wonderful things to follow the fighting. And they will have money to spend. But not with you if your competitor can offer them something better.

To face this challenge your product will have to meet new and higher standards of efficiency, usefulness and durability. Good looks will be important too, and, as always, a full dollar's worth of value.

That is why we remind you as you plan for the future, to plan to use steel wherever possible. For steel has inherent advantages that few materials can equal.

Steel is unmatched for structural strength per unit area. It can reduce weight *safely* and at lowest cost. It can insure super-toughness to provide lasting protection against shocks, severe reversal of stresses, or sudden overloading. Its superior resistance to fatigue, heat, cold, corrosion and abrasion means long life wherever used.

Steel can be polished to mirror surface, plated, painted, or permanently coated with porcelain enamel to add beauty and sales appeal. Its use involves no unfamiliar fabricating problems.

Not only is steel the most versatile of materials, but judged on the basis of performance its economic superiority is outstanding.

9 times out of 10 steel will do it better

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Supply Company, Chicago, *Warehouse Distributors*
United States Steel Export Company, New York

Here are steels with which you can safely build the success of your postwar product

U·S·S STAINLESS AND HEAT-RESISTING STEELS to assure high resistance to corrosion and heat, and to reduce weight.

U·S·S CARILLOY ALLOY STEELS — Special steels for the special jobs of industry.

U·S·S HIGH STRENGTH STEELS to resist corrosion and increase strength without adding weight.

U·S·S COPPER STEEL to give at least twice the atmospheric corrosion resistance of regular steel at little additional cost.

U·S·S ABRASION-RESISTING STEEL to combat wear and friction.

U·S·S HOT-ROLLED AND COLD-ROLLED STEELS to provide the basic advantages of steel, plus maximum economy in accordance with the needs of each job.

U·S·S PAINTBOND—A galvanized, Bonderized sheet that permits immediate painting and holds paint tighter.

U·S·S VITRENAMEL—Sheets designed especially for porcelain enameling.

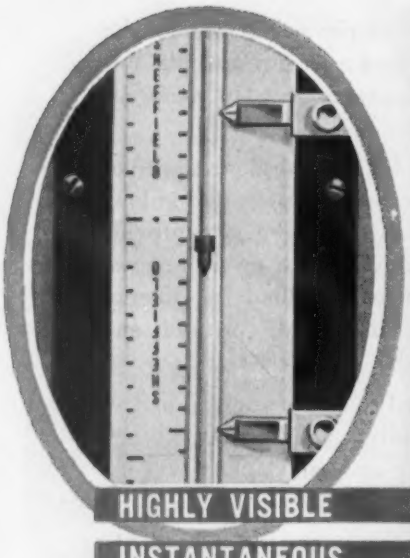
U·S·S ELECTRICAL SHEETS for motors, generators and transformers.

ONLY STEEL CAN DO SO MANY JOBS SO WELL

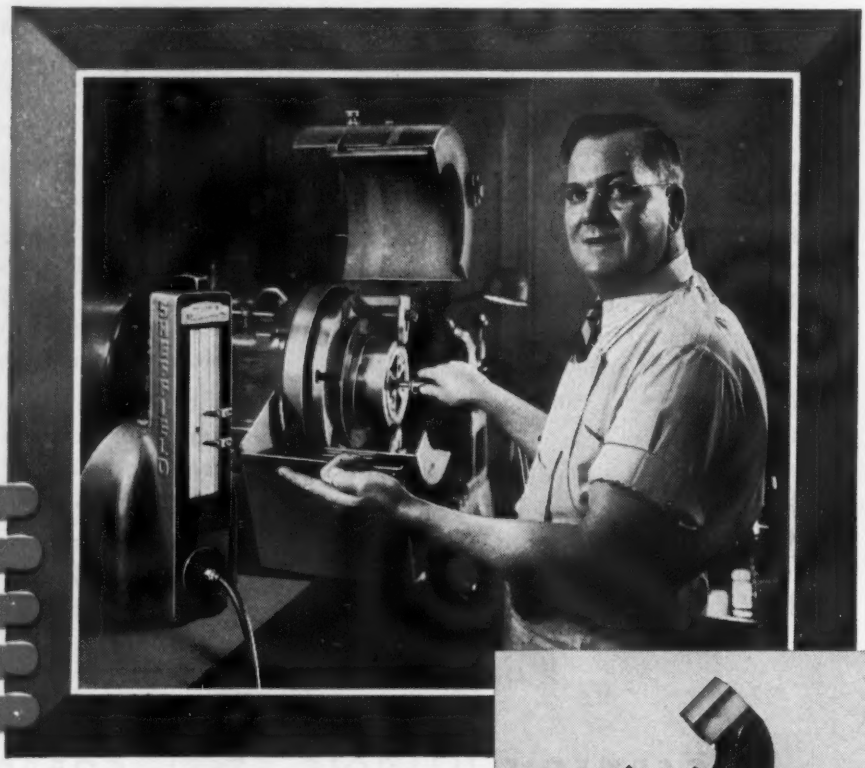
USS STEEL UNITED STATES STEEL

UNITED STATES STEEL

"THE *Float shows me* WHERE I AM!"



HIGHLY VISIBLE
INSTANTANEOUS
POSITIVE
EASIEST TO READ
NO PARALAX



"There's no guesswork about my job—and darned little scrap! I check every piece, starting with the first, right at the machine—and fast, too! The float tells me where I am—whether or not I am doing a good job and whether the machine and the tools are working okay. If something goes wrong, the float tells me, and adjustments are made right away before any amount of scrap is run."

Sheffield Precisionaires are helping thousands of machine operators to do "tough" jobs without realizing they're tough. High amplification combined with an easy-to-see float that "shows where you are" greatly simplifies the job. Scrap, rework and lost time are substantially reduced—production and assembly are increased in quantity and in quality.

"Chek with Sheffield" as to whether the use of Precisionaires at the machine will make your tough jobs easier.

May we send engineering data . . . and have our representative actually demonstrate the PRECISIONAIRE to you?

THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

SHEFFIELD MASTER CRAFTSMEN

MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES

Why FREIGHT ELEVATORS are important!

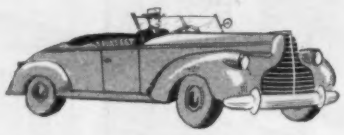
BEHIND this busy scene, freight elevators are constantly on the job . . . keeping supplies and even the trucks themselves moving on schedule . . . without bottlenecks . . . without confusion.

For intensive service, the elevators should be high speed, automatic in operation and provided with power operated doors. Such equipment will compensate for some of the time lost in loading and unloading operations.

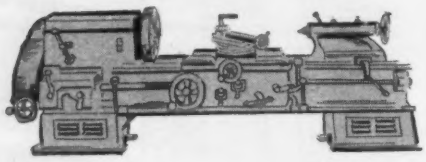
If conditions require, freight elevators can be dispatched to predetermined floors to suit any cycle of operation. Also, they do not necessarily require regular attendants.

Your nearest Otis representative is now available to assist you and your Architect in making preliminary elevator plans and studies. For the finest in vertical transportation tomorrow, call your Otis representative TODAY!

Otis ELEVATOR COMPANY
OFFICES IN ALL PRINCIPAL CITIES



IN A CAR



OR A MACHINE TOOL

IT'S NOT AGE, NOR USE...BUT

abuse

that determines operating efficiency

Your ten-year-old automobile has gone over 60,000 miles. It runs fine, rarely gives you trouble. You drive it intelligently, service it regularly.

My three-year-old one, mileage under 15,000, runs awful. I'm going to turn it in for a new one first chance I get.

Let's face the facts.

Is it age, use or abuse that makes the big difference?

DURING the last four years many newly built machine tools have been operating the clock around, often in semi-skilled hands and with a minimum of normal maintenance. In terms of a machine tool's average life span of useful operation, they are new. Actually they're less productive than machine tools several times older which have received skilled operation and regular maintenance.

Now is the time to estimate the efficiency of these machine tools...not by the yardstick of age, nor of use, but of abuse. The same holds for late-type surplus tools purchased for peacetime use from government stocks.

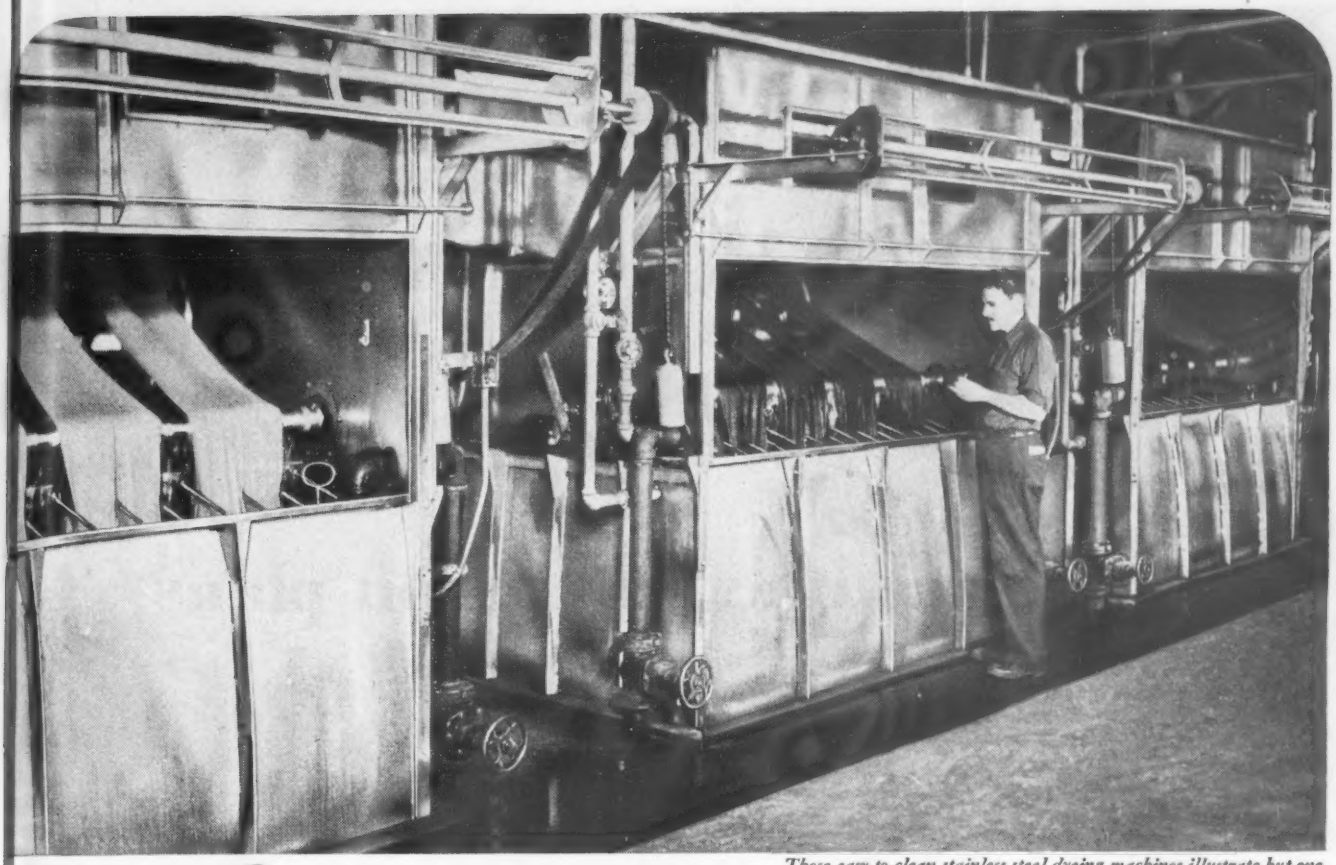
Management, in many of the country's reconverting plants, is making similar surveys of its metal-working equipment and then initiating systematic programs of *Engineered Rebuilding* by Simmons.

Simmons methods have converted planers into hydraulic grinders, doubled the capacity of planers, converted entire plants from belt-driven tools to individual, self-contained motor driven units, lengthened beds and tables, widened housings and provided gear transmissions and other labor-saving devices.

Engineered Rebuilding can play a major part in setting up your new production line. Start today by sending us a list of the machines you need rebuilt. We'll show you how "The Simmons Way" can speed your program.

SIMMONS MACHINE TOOL CORPORATION
1755 NORTH BROADWAY, ALBANY 1, NEW YORK

SIMMONS *Engineered* REBUILDING



These easy-to-clean stainless steel dyeing machines illustrate but one of many applications for lustrous Republic ENDURO in the textile industries. Others include: dry cans, tables, valves, reels, hosiery forms and bleaching equipment.

Enduro Pays in many ways

- Improved Employee Relations
- Easy to Clean
- Assures "True" Colors
- Strong—Long Lasting
- Resistant to Rust and Corrosion
- Easy to Fabricate
- Universal Acceptance
- Low Ultimate Cost

Lustrous, bright, sanitary appearance—plus factor of Republic ENDURO Stainless Steel—pays prompt dividends in improved employee relations.

ENDURO is clean—and remarkably easy to clean. It makes work easier. Employees take pride in keeping it spotless. They find new incentive in the bright, cheerful atmosphere created by gleaming ENDURO equipment. And its smooth, shiny surface never wears out because ENDURO is solid stainless steel all the way through.

There are many other reasons, too, why it will pay you to specify ENDURO Stainless Steel. See your equipment manufacturer or write directly to:

REPUBLIC STEEL CORPORATION

Alloy Steel Division • Massillon, Ohio

GENERAL OFFICES: CLEVELAND 1, OHIO

Export Department: Chrysler Building, New York 17, New York

Republic

ENDURO STAINLESS STEEL

Reg. U. S. Pat. Off.

Other Republic Products include Carbon and Alloy Steels—Pipe, Sheets, Strip, Plates, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

Turn to the pioneer for

Expert Counsel

on peacetime production plans

WITH material and manufacturing costs at a new high level, competition in the postwar era promises to be more keen than industry has ever known before.

Manufacturers who realize this are taking steps *now* to make certain that their postwar programs take full advantage of the newest and most efficient manufacturing tools and processes available.

In the field of abrasives, it is only natural that they should turn to Peninsular—the pioneer in grinding wheel progress.

Today, as always, Peninsular is maintaining its position of leadership through the same endless study and research which has resulted in the development of new materials for abrasive wheels—new methods for their manufacture—new means for their application to industrial problems.

A STANDING INVITATION

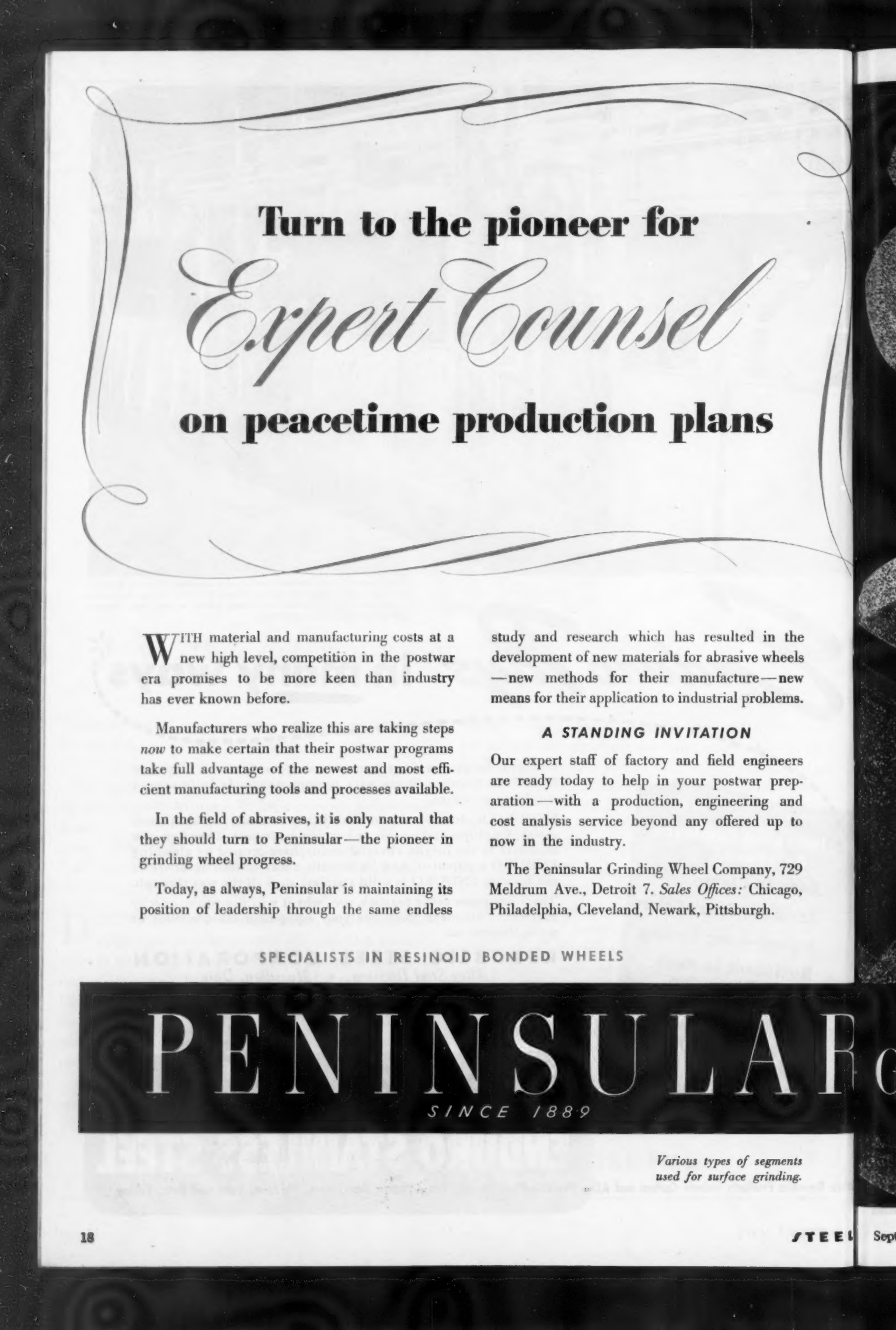
Our expert staff of factory and field engineers are ready today to help in your postwar preparation—with a production, engineering and cost analysis service beyond any offered up to now in the industry.

The Peninsular Grinding Wheel Company, 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Cleveland, Newark, Pittsburgh.

SPECIALISTS IN RESINOID BONDED WHEELS

PENINSULAR

SINCE 1889

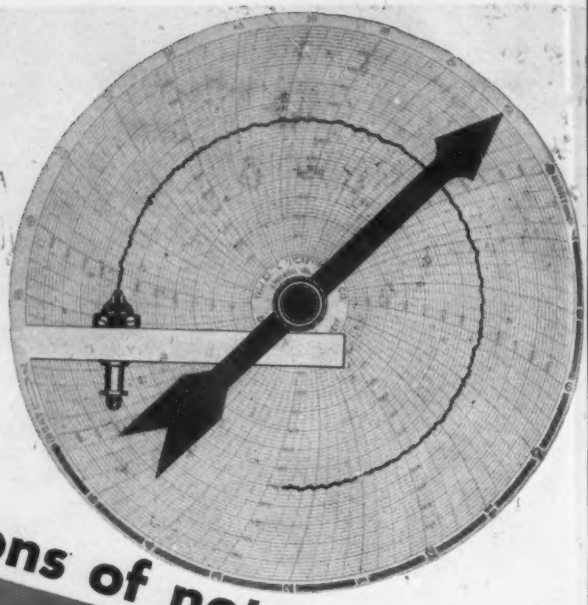


Various types of segments used for surface grinding.

INDIVIDUALLY PENINSULAR ENGINEERED
GRINDING WHEELS

CHART SHOWS

temperature variations of not over 5° F.



For aging, annealing, bluing, drawing, tempering, normalizing—Maehler recirculating air heat furnaces are providing heat uniformity that is VIRTUALLY PERFECT. These units are the last word in efficient, low cost operation and are solving many of today's heat treating problems.

An example of how Maehler furnaces are being used for heat treating of magnesium is shown in the photo at the left. These Maehler recirculating air heat furnaces are two of the 46 Maehler units at the Howard Foundries in Chicago. The furnace to the right in the picture is used for aging magnesium castings at 350° F. Full capacity in this furnace is 4000 lbs. From a cold start it requires about one hour for ovens to reach the 350° temperature. The castings are aged for 16 hours. The furnace at the left is used for normalizing magnesium castings. This operation requires 6 hours at 450° F. Furnaces operate independently and are gas fired. Recent reports indicate that during both of these operations temperature chart variations of not over 5° F. are maintained.

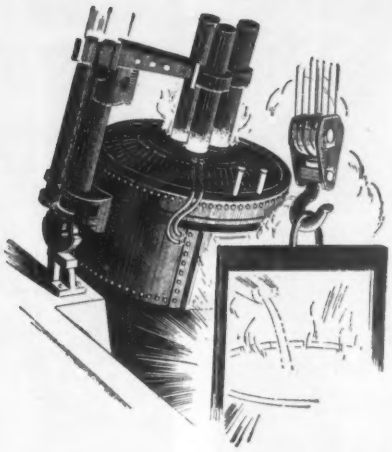
Bring your heat treating problems to Maehler—you can do the job better, faster and at lower cost with Maehler furnaces—oil fired, gas fired or electrically heated units available for handling temperatures up to 1300° F. Call a Maehler engineer today or write for latest bulletins.

THE PAUL MAEHLER COMPANY
2208 W. Lake Street Chicago 12, Illinois

MAEHLER

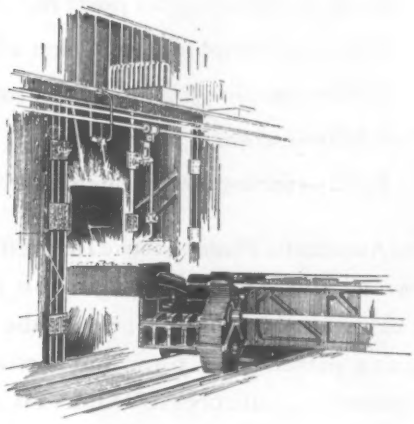
Industrial Ovens and Furnaces for Normalizing, Stress-relieving, Bluing, Aging, Tempering, Annealing, Drawing, Etc.

Practical Men to Give Practical Help Where Alloy Steels are Made and Used



Electromet field men, because of their broad steel-plant experience, are frequently asked to help solve difficult steel problems. They are located in every major steel-making center. They talk the steelmaker's language and understand his problems.

These field metallurgists can advise on the selection and best use of the sizes and grades of ferro-alloys available. They are familiar with a wide group of alloys; they do not have one "stock" answer for all problems. And their experience is backed by an extensive research program in the development of better alloy steels.



In your design-engineering department, Electromet metallurgical engineers are prepared to help solve specific problems in the selection, fabrication, or use of alloy steels — especially stainless steels. If you have a problem in the use of alloys or alloy steels, call on Electromet. Further information about this service and brief descriptions of Electromet ferro-alloys and alloying metals are found in the booklet, ELECTROMET PRODUCTS AND SERVICE. Write for your copy.

BUY UNITED STATES WAR BONDS AND STAMPS

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

ELECTROMET Ferro-Alloys and Metals
are sold by Electro Metallurgical Sales Corporation, and
Electro Metallurgical Company of Canada, Limited, Welland, Ontario

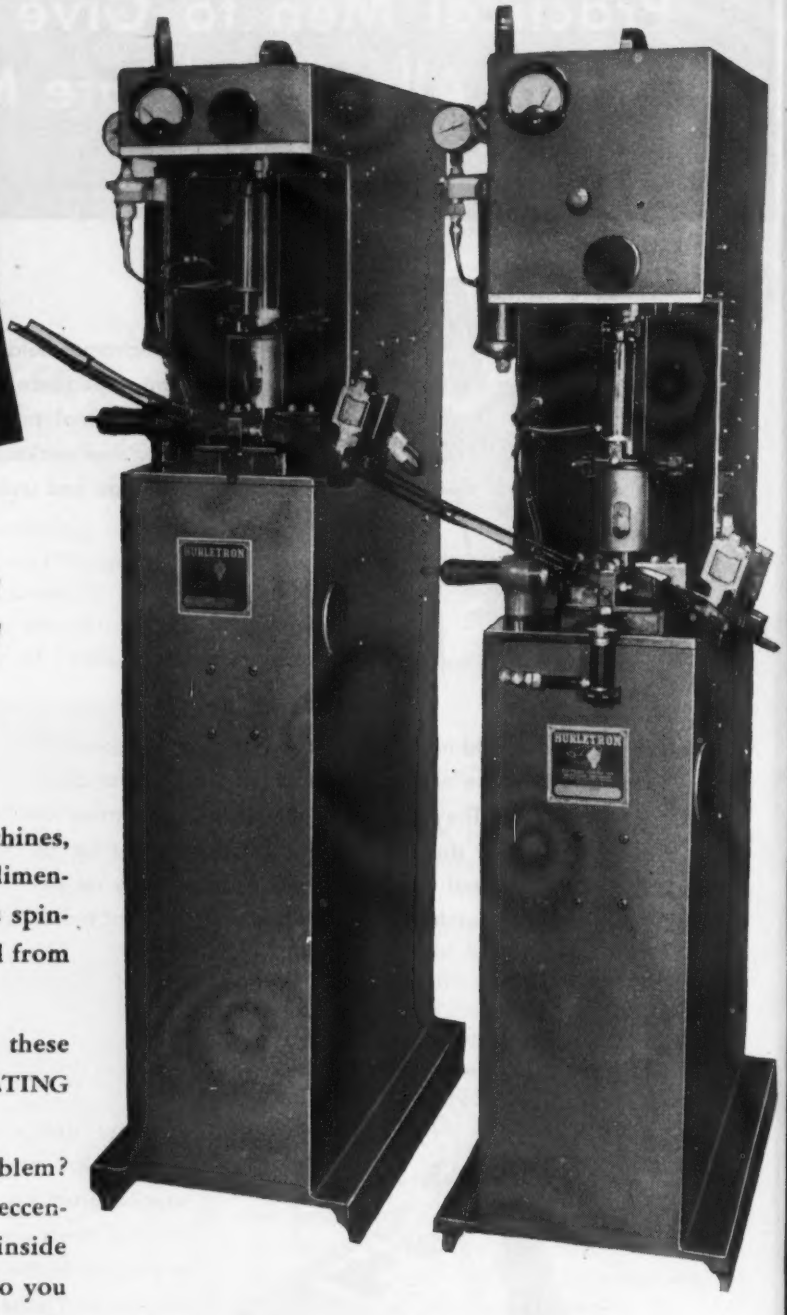
Electromet
Trade Mark
Ferro-Alloys & Metals

THESE *Automatic Inspection* MACHINES

ARE *saving*

ONE MANUFACTURER

$108.00 per shift per day!



AND—*inspecting 60 parts per minute!*
AND—*eliminating the human element!*
AND—*multiplying inspection rate!*
AND—*increasing accuracy!*
AND—*sorting automatically!*

These Automatic Photoelectric Inspection Machines, known as Hurletrons, are gaging an inside dimension to an accuracy of .0001 while the part is spinning at a prescribed r. p. m., and sorting good from bad pieces . . . entirely AUTOMATICALLY!

Actual, direct savings in this plant using these Hurletrons make this equipment SELF-LIQUIDATING in less than 60 one-shift work days!

Do you have an inspection or control problem? Do you need to check taper, concentricity, eccentricity, over-all length, contour, outside or inside diameter, or turbidity of production parts? Do you need production inspection of electrical characteristics such as resistance, voltage, amperage or capacitance? The answer to these problems may be found in Hurletrons built to perform these inspections *automatically!*

Let us suggest automatic solutions to your inspection problems *now.* Our engineers will gladly consult with you and submit unbiased recommendations without obligation on your part.

HURLETRON

Automatic Electronic

INSPECTION • CONTROL • ASSEMBLY

ELECTRIC EYE EQUIPMENT COMPANY • 11 West Fairchild Street • Danville, Illinois

Can the life of steel products really be increased by 4 to 1?

"SOUNDS impossible," you say? Well, before Pearl Harbor you would have been right.

Then something happened. A startling discovery that means you may soon be able to buy washing machines, automobiles, hardware, *many* important metal items that can outlast any you've ever owned before by 4 to 1!

The discovery is CORRONIZING, a miraculous new weapon against corrosion and rust. Invented by scientists of the Standard Steel Spring Company, CORRONIZING is a new alloy "armor" that *far outlasts other rust-resisting coatings for steel.*

This is no mere claim. It has been proved in the war, on land and sea in every kind of climate. Progressive manufacturers and retailers will soon be able to bring you products made with "Corronized" steel. Motor car makers—always a step ahead—may be among the first to offer this sensational advantage.

So watch for the wonderful new products that will be made with "Corronized" steel. They can defy rust ... keep their beauty and safety years longer ... increase the service you get for your money as much as 4 to 1.

Standard Steel Spring Co.

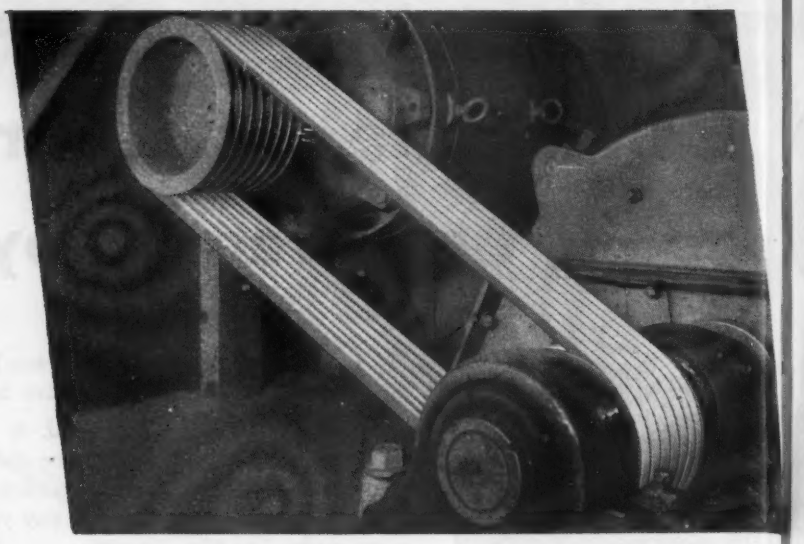
ORIGINATORS OF

CORRONIZING

Quick Facts for Manufacturing and Sales Executives

Do not confuse CORRONIZING with other metal coatings. This patented process provides a permanent alloy "armor" with 5 layers of defense against corrosion! It becomes part of the steel base . . . can be worked in any manner. Permits using lighter materials by prolonging steel's period of greatest strength. Write for samples and complete information.

STANDARD STEEL SPRING COMPANY
CORAOPOLIS, PENNSYLVANIA



No "Pre-War" Belts EVER Gave the Service that is

NOW Being Delivered by Your *Standard* GATES VULCO ROPES!

Here is the Reason:— Good belts were built before the war but none of them had the strength and durability found necessary on army tanks, tractors and self-propelled big guns. Gates developed these greatly superior V-belts for combat service—and here is why this fact is important to you NOW:—

Every improvement developed by Gates for U. S. combat units has been added, day by day, to the quality of the standard Gates Vulco Ropes which have been delivered to you.

Here is one rare instance in which improvements developed primarily for army combat use can be passed on to you immediately—and there are, of course, good reasons why Gates has not been called upon to withhold these important improvements from industrial V-belt users.

Efficient production in our nation's industrial plants is a prime essential to our winning of the war—and better V-belts than ever before have been urgently needed to keep machines going on the forced-draft, war production schedules that have had to be maintained 24 hours a day!

That is why Gates has been able to embody in the standard Gates Vulco Rope every V-belt improvement which Gates specialized research has developed for use on the Army's motorized equipment—and that is why you are finding that your standard Gates Vulco Ropes are today giving you better service than any V-belts that were built before the war.

All Gates V-Belts are Built with *The Patented* **CONCAVE SIDE—**

Gates THE MARK OF SPECIALIZED RESEARCH

459

THE GATES RUBBER COMPANY

Engineering Offices and Jobber Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO 6, ILL., 549 West Washington. NEW YORK CITY 3, 215-219 Fourth Avenue. ATLANTA 3, GA., 521 C. & S. Nat'l Bank Bldg.

LOS ANGELES 21, CAL., 2240 E. Washington Blvd. DENVER 17, COLO., 999 S. Broadway. DETROIT 2, MICH. 223 Boulevard Bldg.

PORTLAND 9, ORE., 333 N.W. 5th Ave. DALLAS 2, TEXAS, 1710 N. Market St. SAN FRANCISCO 3, CAL., 170 Ninth St.

INGERSOLL D-B-L* HACK SAW STEEL

**Furnished in the original D-B-L Regular,—"5-4" and D-B-L 2,—"6-5".*

Whichever Ingersoll D-B-L Steel you specify, you are sure of getting more of all four . . .

- ★ Tough Cutting Edges
- ★ High Impact Resistance
- ★ Relative Freedom from Decarburization
- ★ Lower Cost

INGERSOLL STEEL & DISC DIVISION
BORG-WARNER CORPORATION
NEW CASTLE · INDIANA
PLANTS: NEW CASTLE, IND.; CHICAGO 4, ILL.; KALAMAZOO, MICH.

INGERSOLL SPECIAL STEELS FOR SPECIAL USES

Alloy Steels
Armor Plate
Clutch Plate Steels
Tillage Steels
Soft Center Steels
Shovel Steels
Knife Steels
TEM-CROSS Steel
IngAclad (Stainless-Clad Steel)
Stainless Steels and Saw Steels, including "18-4-1" and Molybdenum and D-B-L Hack Saw Steels

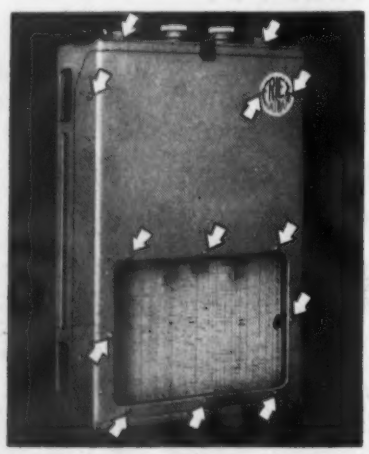
Here's the place to "Blitz" your Fastening "Bugs"

WHY GET TOOLED UP FOR TROUBLE?

Now, while you are designing or redesigning products for the postwar market, is the time to question every fastening. Is there any needless tapping? Avoidable bolt assembly? Costly inserts in plastics? Riveting in hard to reach places?

If these operations are planned for any spot where a P-K Self-tapping Screw could be used, you are tooling up for trouble–slowdowns that will show up soon in the cost records.

A switch to the short cut fastening method – with P-K Self-tapping Screws – often saves from 30% to 50% in assembly time and labor. Find out now how P-K Screws can give your product this cost advantage against competition!



MAXIMUM SECURITY IN FASTENINGS TO CAST ALUMINUM . . . FOR ⅓ COST

Julian P. Friez & Sons, Inc., adopted Type "Z" and Type "U" Self-tapping Screws to assure the security of many small parts in their portable recording instrument which is built to stand severe field service conditions. And, they saved money, too, because – "if machine screws had been used it would have been a real task to tap small holes and cost would be triple."

PUT YOUR PLANS THROUGH THE "PAR-KA-SCOPE"

LENS of the "Par-Ka-Scope" is the eagle eye of a P-K Assembly Engineer. He can help you focus on the fastening "bugs" that usually hide out until you are all set up for production, then start running up costs.

Whatever they are, he'll help you find them now, when a changeover requires only a little pencil work. He'll recommend only the best Self-tapping Screw for the job – P-K makes *all* types. Tell us when you'd like him to call, or send assembly details for recommendations. Parker-Kalon Corp., 208 Varick St., New York, 14, New York.

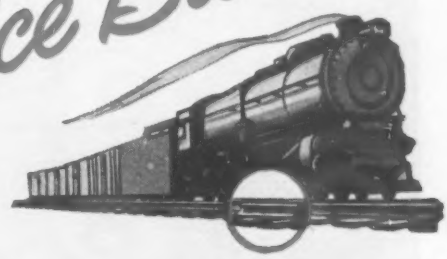
GET THIS GUIDE – IT'S FREE. The P-K "Users' Guide" describes all types of P-K Self-tapping Screws, tells where and how to use them . . . information every designer and assembly planner needs. Write for it.

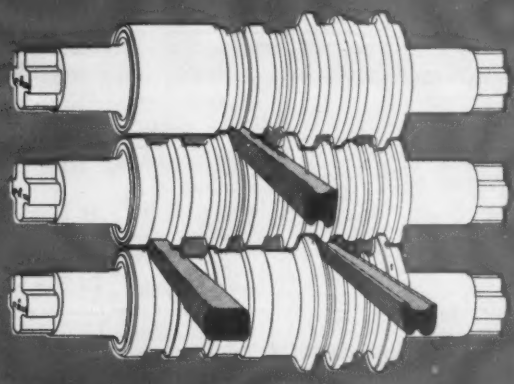
PARKER-KALON
Quality-Controlled
SELF-TAPPING SCREWS

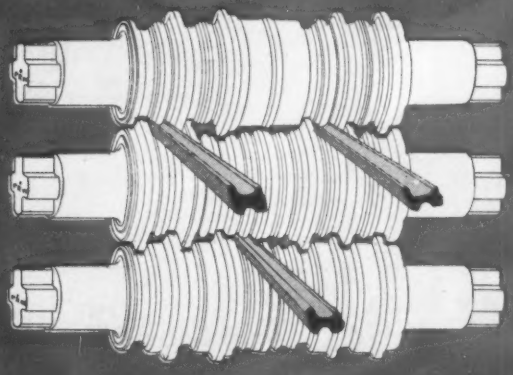
For Every Metal and Plastic Assembly

ROLLING TECHNIQUE . . .

Splice Bars

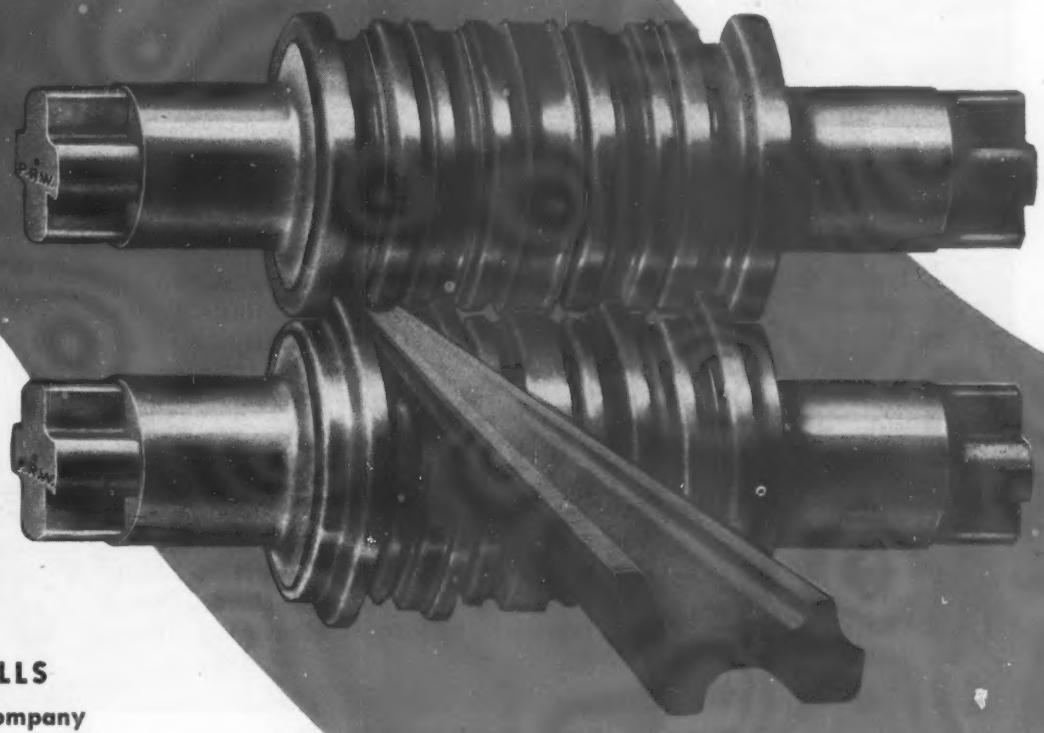






The thousands of miles of rails that make up the numerous networks of railroads throughout the world, require many, many tons of splice bars to join and hold these rails rigid and in perfect alignment. This makes it possible to carry our modern high speed trains loaded to capacity with essential travelers and critical materials of war quickly and safely to their destinations.

Pittsburgh Rolls, with three-quarters of a century of roll-making experience and satisfactory performance behind them, can be relied on to deliver the production of highest quality for which high speed modern mills are designed *at less cost per ton of steel rolled.*



PITTSBURGH ROLLS
Division of Blaw-Knox Company
PITTSBURGH, PA.

PITTSBURGH ROLLS

When the Automatic Coupler was introduced

Standard Steel's FREEDOM WORKS

was producing 1519 tons of steel a year

A lot of things happened back in the early Seventies that were important to American railroads and American industry then . . . and are still important now.

The refrigerator car and the air brake were still in their infancy. The Janney Car Coupler, the Quadruplex Telegraph, the Telephone and Electric Welding all came along in the one decade. In the year the coupler was introduced, "Freedom Works" was operating a crucible plant with 28 four-pot melting holes, turning out 1500 tons of steel a year.

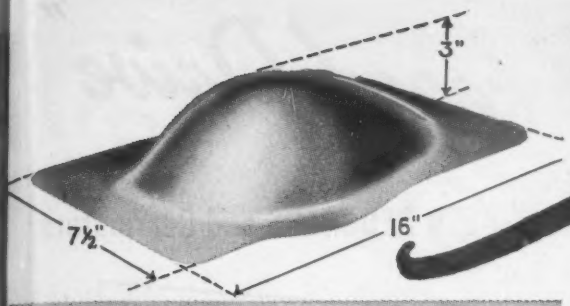
This steel was formed and fabricated by forty highly skilled tire rollers, hammer men and machinists. Today in the same location, Standard Steel is turning out quality forgings and castings for every need . . . and descendents of these same men are helping to do the job.

The best and easiest way to be sure of quality and satisfaction in your forgings and castings is to "Standardize on Standard." The Baldwin Locomotive Works, Standard Steel Works Division, Burnham, Pa., U. S. A. Offices: Philadelphia, New York, Boston, Washington, Cleveland, Detroit, St. Louis, San Francisco, Houston, Pittsburgh, Chicago.

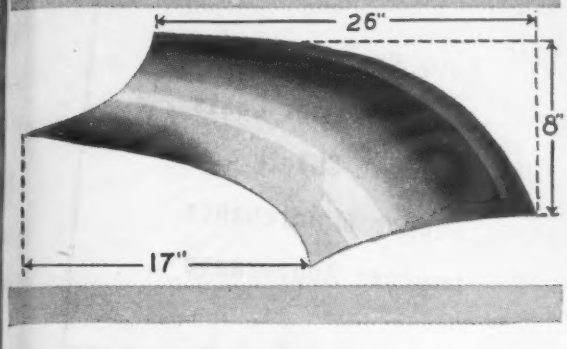
BLW THE BALDWIN GROUP

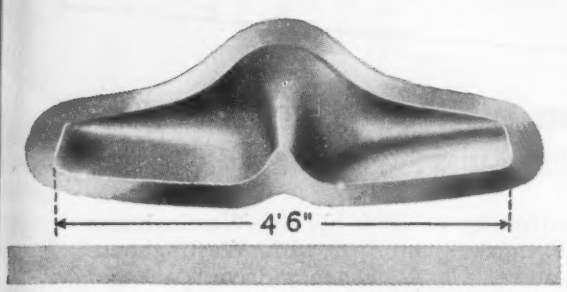
BALDWIN

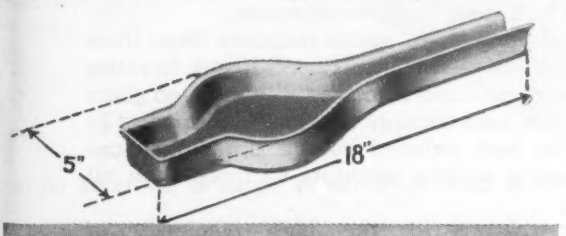
STEEL FORGINGS & CASTINGS

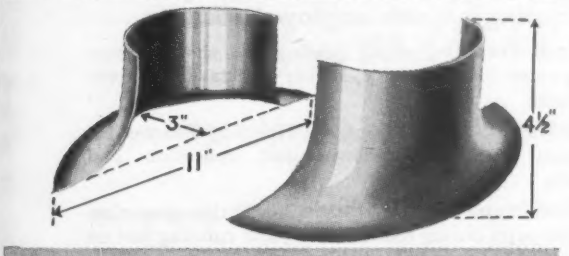


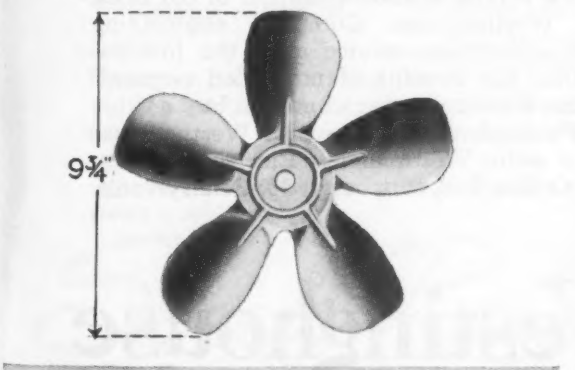
Shapes of things to come!

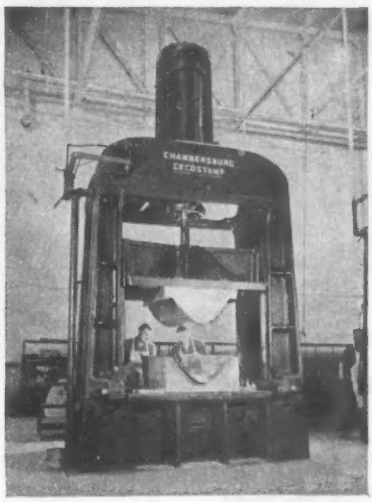












WILL YOUR PEACE-TIME PRODUCTS INCORPORATE SHEET METAL PARTS LIKE THESE?

•

INVESTIGATE

The CECOSTAMP

for moderate runs or for finishing operations on long-run production

The CECOSTAMP is a high production, impact-type drop stamp designed to form metal parts from sheets of high strength and great resilience. It was designed by Chambersburg engineers to solve the immediate and urgent sheet metal production problems of the aircraft industry. The CECOSTAMP is in use in practically every airplane factory in the U.S., Great Britain and the U.S.S.R.

INEXPENSIVE, EASILY MADE DIES

One of the great advantages of the CECOSTAMP is that dies can be made quickly, easily and inexpensively of lead, zinc, Kirksite or similar metals that can be poured in sand molds made with plaster of paris patterns. When run is completed or part changed, dies can be melted and metal used again. Dies have also been made of plywood or other easily workable material.

SPRINGY METALS PERMANENTLY SET

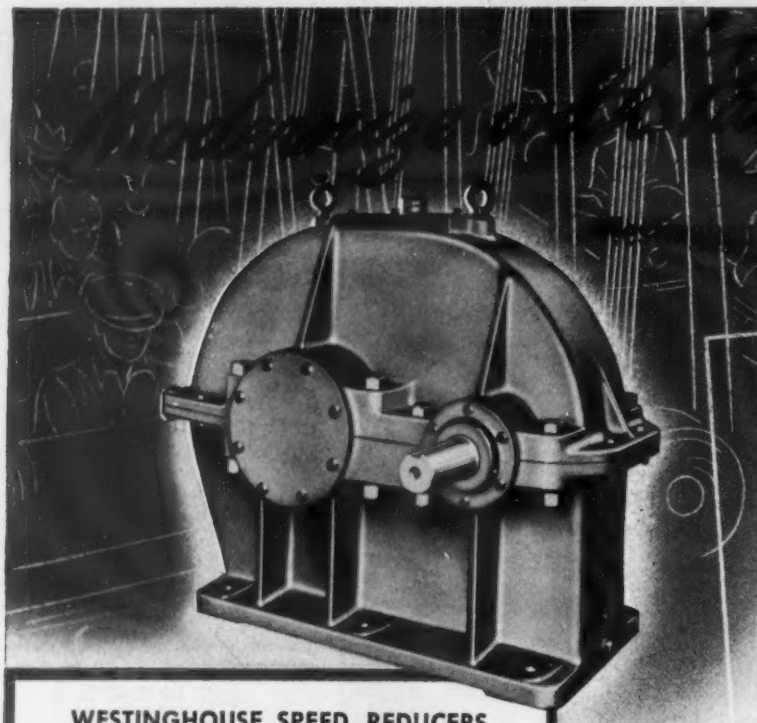
The CECOSTAMP is often used as the finishing tool on a series of press operations, to bring the part to final dimensions and give it a permanent set. No matter how springy or resilient the sheet may be, a blow from the CECOSTAMP will result in a permanent set.

For details on its use as a complete operation or finishing machine, write, explaining your particular interest. We shall be glad to send complete information.

CHAMBERSBURG ENGINEERING CO.

CHAMBERSBURG **PENNSYLVANIA**

CECOSTAMP

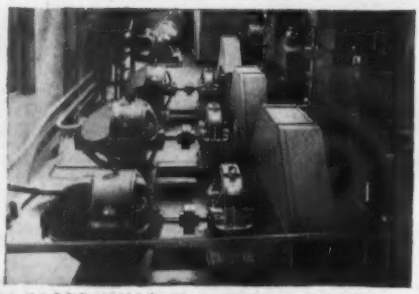


"Matched and Packaged Drive"

SPEED REDUCERS and Gearmotors

Save Space
Reduce Power Costs
Increase Safety
Reduce Maintenance
Improve Appearance

WESTINGHOUSE SPEED REDUCERS MAKE COMPACT DRIVES



IN PAPER MILLS. For maximum efficiency and long, trouble-free service, these Tandem Drives for board calenders are individually mounted as complete units on structural bedplates.

IN CEMENT PLANTS. A Westinghouse Speed Reducer provides power at 145 rpm from a 100 hp, 870 rpm motor. Complete Westinghouse Equipment here, assures undivided responsibility.

IN STEEL MILLS. Type DH-18 Westinghouse Speed Reducer provides reliable power to a single-chain type drawbench from a 75 hp, 570 rpm motor.

Save time with Simplified Ordering . . . Simplified Installation . . . Simplified Maintenance

For drives up to 1000 hp, the Westinghouse Speed Reducer—complete with Westinghouse motor—makes a high efficiency drive "package" which is "a natural" for reconversion.

The advantages of speed reducers stem from two major features: (1) reduced losses, because power is transmitted through fully enclosed gears with shafts anti-friction bearing equipped; (2) longer life and reduced outage time... because maintenance seldom amounts to more than oil changes.

Other reasons for the high efficiency of Westinghouse Speed Reducers are the precision manufacturing methods employed, such as:

- ***BPT Heat-Treating*** of all gearing and shafts. Gears have greater load capacity, higher resistance to wear and shock.
- ***Single Helical Gears***—cut by Hobbing Process for maximum accuracy... assure quiet operation and long life.
- ***Detailed Inspection Methods*** — Station-to-station check on parts during manufacture, and running test on each assembled unit before shipment.

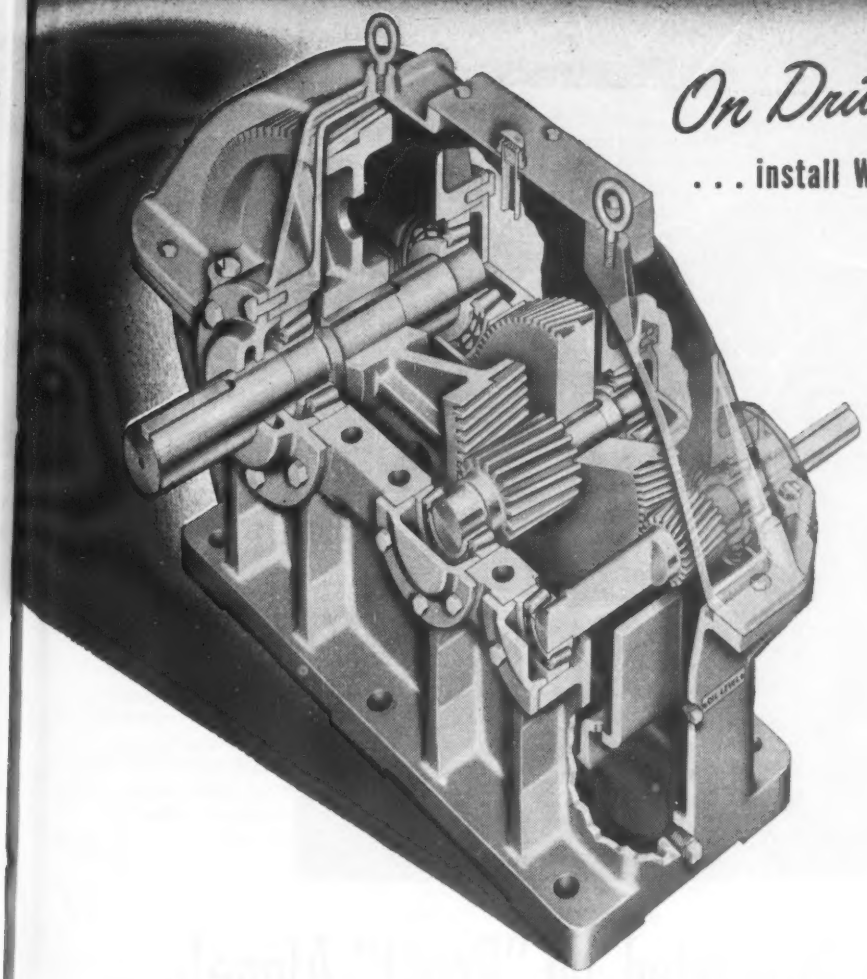
On new drives, or modernization of old ones, consult Westinghouse. Complete engineering facilities... complete service after the installation... plus the benefits of undivided responsibility, that's what you get when you buy a drive from Westinghouse. Call your Westinghouse office, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-07232

WESTINGHOUSE

Westinghouse

There is a Westinghouse speed reduction unit for most application needs



On Drives up to 1000 hp

. . . install Westinghouse Speed Reducers

Benefit these 6 ways:

1. Minimum maintenance
2. Higher drive efficiencies
3. Maximum reliability
4. Improved appearance
5. Increased safety
6. Designed and applied to A.G.M.A. Standards

Two types of standard Westinghouse Speed Reducers—offer speed ratios from 2.82 to 70.5. The type SH single-reduction unit is available with 13 standard ratios, from 2.82 to 9.5. The type DH double-reduction unit is available with 15 standard ratios, from 11.8 to 70.5. Special units are available for unusual conditions.

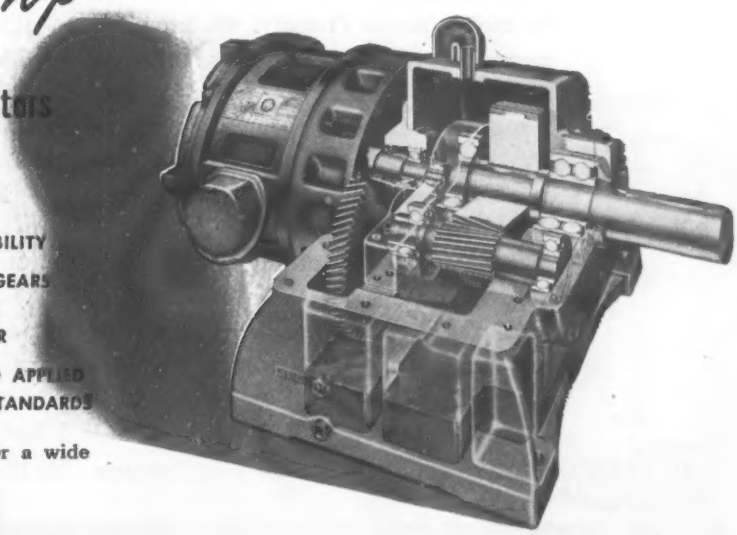
For Drives 1 to 75 hp

. . . install Westinghouse Gearmotors

Here are 6 good reasons:

1—HIGH EFFICIENCY
2—MINIMUM NUMBER OF PARTS
3—USE ALL STANDARD TYPE WESTINGHOUSE MOTORS
4—EASY ACCESSIBILITY
5—MOTOR AND GEARS BUILT BY ONE MANUFACTURER
6—DESIGNED AND APPLIED TO A.G.M.A. STANDARDS

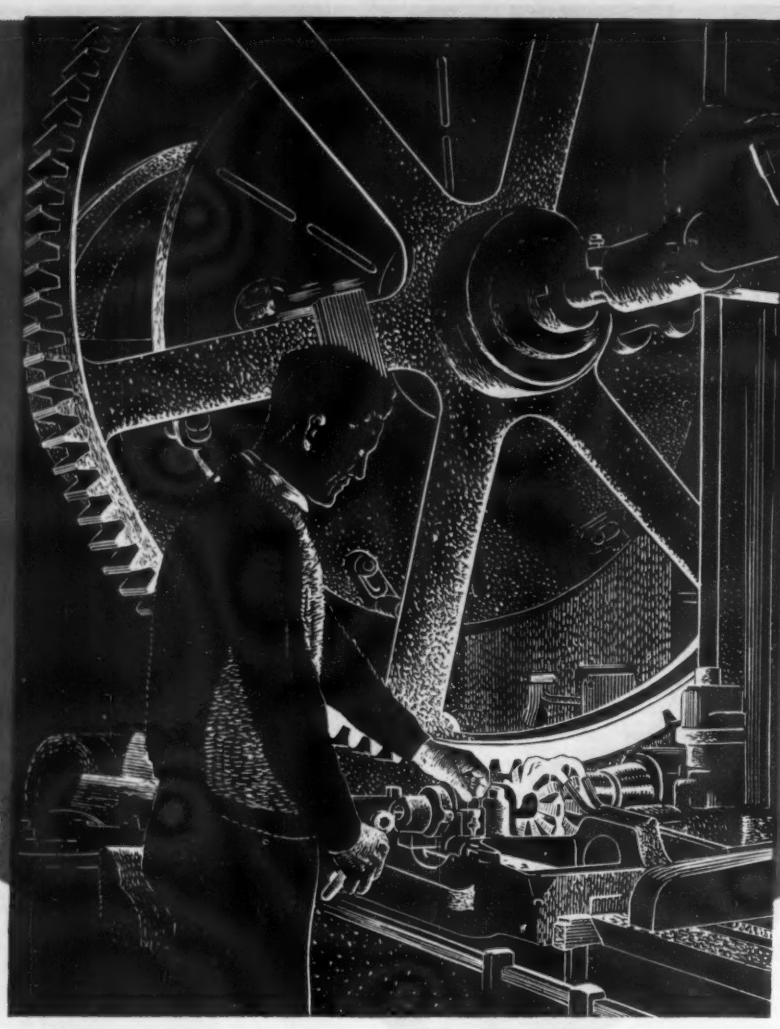
A complete line of gearmotors is available for a wide range of applications.



A typical double-reduction type gearmotor.

Speed Reducers

"The mark on Finer Gears"



Cutting a large diameter spur gear

We Are Not Motivated by "Profit" Alone!

If financial gain was our sole concern, we would be better in any of several other businesses. The fact is, we like to make gears. Frankly, we have on occasion filled orders for unusual gears that — were profit our only motive—wouldn't have been undertaken. We are not so concerned about "our cut" as we are about whether the teeth on the gears you order are properly cut. This attitude, which has permeated our whole organization, is probably the reason why some of America's largest and most discriminating gear buyers have for so long made "IIIlinois" their gear headquarters.

Illinois Gears are "Five Star Gears": ★ Material has been carefully double-checked, ★All gear cutting is done by highly skilled and experienced craftsmen, ★Required accuracy is inbuilt, ★ Every gear is double-inspected after completion, ★ Delivery is as promised.

You will find helpful data on gears and details of our production facilities in Catalog 39, sent on request.

ILLINOIS GEAR & MACHINE CO.
Chicago (35) Illinois

ILLINOIS GEAR & MACHINE COMPANY

Advertisement SEPTEMBER, 1945

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Copper Tubing for Industrial Purposes

Reduces Upkeep and Avoids Replacements

The advantages of brass and copper piping for homes and fine buildings have long been recognized by engineers and architects. It is only recently, however, that copper water tubing for water, air, oil and hydraulic lines is being specified for factories and other industrial construction now in the planning stage.

Although construction engineers are familiar with the advantages of non-rustable piping, many have considered this material too expensive for factory buildings. However, the fact that modern factory construction is so sturdy that it outlasts rustable piping a number of times has been recognized by maintenance departments called upon to replace pipe lines which have deteriorated and become clogged by rust and sediment, or which are leaking at the threaded connections. To replace large size piping with the same material as originally used is extremely difficult from the maintenance angle because facilities for handling the heavy sections are not convenient, especially when much of the work must be done without interrupting production.

Copper Tubing More Convenient

However, with copper water tubing and solder-joint fittings, such work becomes much more practical. One reason is because copper water tubing of equal capacity is one-half to one-third as heavy as threaded rustable pipe. Threading a pipe may reduce the effective wall thickness by as much as one-half since leakage first occurs at the threaded section. With copper tubing, using solder joint fittings, no appreciable reduction in effective wall thickness takes place and correspondingly lighter gauges can be used. Another factor which must be considered in maintenance, is the necessity for sufficient space in which to turn threaded pipe when screwing it into the fitting. Frequently space is so limited that it is impossible to get a wrench in to turn the pipe. Another reason why smaller sizes of copper tubing can be used to replace larger piping which has deteriorated is because with copper tubing there is no need to use over-size pipe lines to make up for the smaller opening due to rust and sediment.

Once a plumber or steamfitter becomes accustomed to installing copper water tubing with solder-joint fittings, he will continue to use it so that in time an old factory building may become modernized as far as its pipe lines are concerned.

More Efficient and Economical

Aside from water lines, copper tubing is superior to threaded pipe for hot water, air, oil and hydraulic lines. The absence of sharp bends, rough edges and obstructions reduces internal friction so that in most cases, copper tubing of smaller sizes than threaded pipe can be used. The rough and deformed edges left by pipe cutters constitute a serious loss of efficiency in the case of threaded pipe which has not been reamed after cutting. In many cases coils in heaters and large hot water tanks have been replaced by copper, with improved heat transfer and longer life.

It will be found that even the first cost of installing copper tubing frequently is lower than the installation cost of threaded rustable pipe even though the copper tubing itself may be higher in cost. From the practical standpoint further economies are realized as time goes on. For example, should it become necessary to make changes or to remove the copper pipe lines, this can be done simply by heating up the soldered fittings with an acetylene torch, then disconnecting by pulling the tubing out of the fitting. The material can then be used over and over again without loss in efficiency.

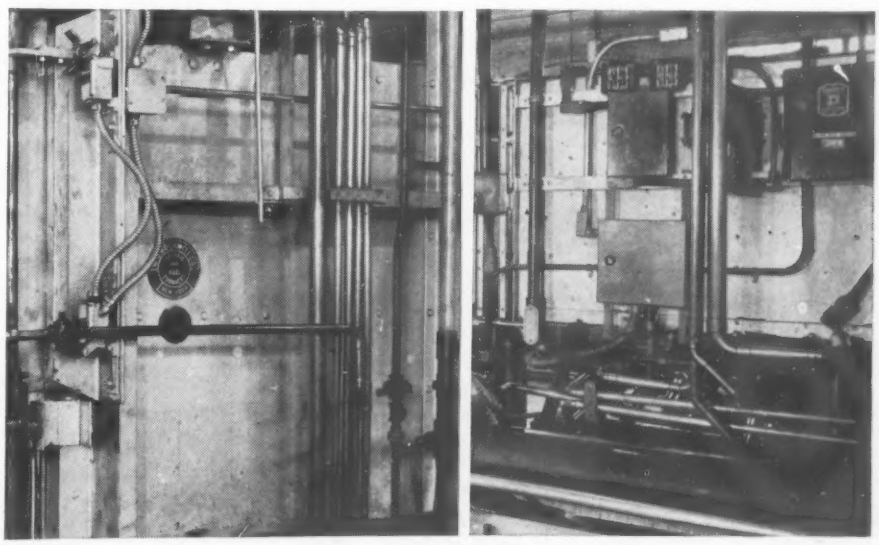
Experimentation with copper tubing for heating lines has shown that much smaller sizes than were thought necessary, can be used. Since the small diameter tubing presents a comparatively small surface area to the atmosphere, the loss from heat conduction is low. Consequently, many heating engineers do not go to the expense of covering all the lines with insulation, but cover only those places where the tubing is exposed to a current of cold air.

Tubing for Higher Pressures

Where hydraulic lines operate under pressures too high for the standard sizes of copper water tubing, it is possible to use Navy type copper or brass tubing, which comes in several wall thicknesses to take care of a wide range of pressures. Navy type tubing uses the same O. D. dimensions as S. P. S. piping and is generally joined together with "Walseal" type fittings with silver solder.

When even more strength is required, it is possible to obtain tubing made from Duronze V or Duronze II, silicon bronze alloys, which have fine corrosion resistance and are approximately 50% stronger than copper. These also can be joined by silver solder.

Write for "Water Pipe Sizes", Bridgeport's 64-page booklet which contains many tables and considerable engineering data as well as suggestions for installing pipe and tubing.



Hydraulic lines of Bridgeport Type K Copper Tubing with solder type fittings. These carry fluid at pressures of 350 pounds per square inch to operate the doors and pushers of an annealing furnace.

COPPER ALLOY BULLETIN

CAUSES OF CORROSION

This article is one of a series of discussions by C. L. Bulow, research chemist of the Bridgeport Brass Company.

CREVICE CORROSION—PART 2

Many metal failures result from the crevice which forms in the area of contact between similar metals, dissimilar metals and non-metallic substances.

A few illustrations should help to make this clear:

1. Cotton threads or fabrics; wood, wood chips or sawdust; glass and glass fragments; sand; seaweed; coke; oil drops; etc. on a metal surface in sea water.
2. Tie rods and bolts touching wood and passing through wood in vinegar and pickling tanks.
3. Cables, sheaths and pipe resting on moist duct walls, masonry, planking, etc.
4. Metal roofing (steel or copper) in contact with wood.
5. Wire rope, cable and stranded wire, corroding internally between the strands.
6. Wire gauze or screens where the wires cross one another.
7. Inaccessible corners in many structures, such as in tanks, heat exchangers, heating coils close to tank walls, overlapping structural parts, etc.
8. In threaded sections of: piping and fittings; nuts and bolts; etc.
9. Riveted joints.

In many instances other corrosion accelerating factors may complicate the situation. These factors may be—

1. A galvanic couple (iron coupled to copper alloy).
2. Stress in the threaded section due to metal cutting operation.
3. Type of wood and composition of the masonry or corroding liquid.
4. Composition of the metal.

While these factors frequently may play a part, their importance has been overemphasized since, after all, elimination of the crevice by some ingenious means removes the trouble.

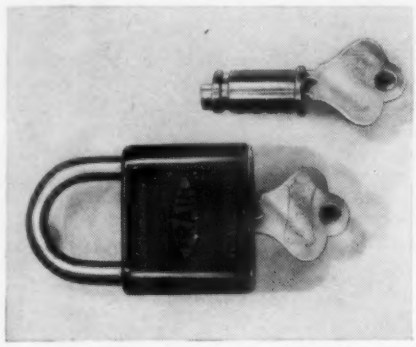
The potential danger of the crevice around a riveted joint is widely recognized. Riveted joints usually give much trouble due to the accumulation of rain water or other corrosive liquids around the rivets. Much work has been done to eliminate such crevices through the use of—

1. Welded joints.
2. Soldered joints.
3. A suitable dope in the joint.
4. Proper design to avoid crevices.

Ledrite for Hardware

The great demand for Fraim locks by our armed forces, as well as civilians, made it necessary for the Fraim Lock Company to develop special equipment and methods for high speed production, while maintaining precision.

One of the vital parts of this lock is the key chamber, made by an intricate milling process, then turned and cut off on an automatic screw machine. The high speed



Lock, key chamber, keys, Courtesy Fraim Lock Co.

production of this part and its final accuracy depend upon the special properties of Bridgeport's Ledrite rod from which it is made.

Ledrite free turning rod, developed by Bridgeport some years ago, has revolutionized the screw machine industry by increasing both the speed of production and the quality of finished products. Ledrite high speed free turning brass rod is very uniform in properties, accurate in gauge, and exceptionally free cutting.

Bridgeport supplies a number of rod alloys for screw machine parts, including Ledrite Standard and Medium, leaded commercial bronze, leaded naval brass, medium naval brass, non-leaded naval brass and Duronze III, a silicon aluminum bronze for engineering requirements demanding exceptionally high strength, corrosion resistance and wearability. Duronze III machines from 50% to 75% as fast as Ledrite.

The keys illustrated above are made from a special stock which permits fast production, and which has exactly the correct hardness to withstand twisting and the unusual wear caused by pins traveling over the notches in the key.

This exact degree of hardness is necessary to overcome unnecessary burring after the various milling operations even though the keys are passed through a hardened steel die after being processed.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

A New Annular Marker is reported to incorporate several innovations in design to speed up marking in production. It is claimed the same size type blanks and characters can be used for all small or large flat surface radii being marked. Date changes are easily made since a single character can be removed without disturbing the rest of the type. **No. 627**

An Internal Grinding Machine is reported with 10½ in. swing, 11 in. hand feed, and a spindle speed of 27,000 rpm. Designed for general tool room use, the machine measures 36 in. by 68 in. by 58 in. high and weighs 800 lbs. **No. 628**

A New Liquid Adhesive is claimed to secure printing plates made of copper, zinc to wood or metal blocks in the place of nails. The material, based on synthetic rubber, has approximately 46 per cent solids content. It can be thinned with water and is resistant to both water and alcohol after it has set. **No. 629**

Plier Type Electrodes for electric spot welders are claimed to permit the welding of very small, fine parts made of brass, bronze, copper, monel metal, nickel, steel, and tin. The unit connects to any spot-welding machine equipped with a welding timer and capable of being set for ½ to 1 Kva. output on 10 amperes. **No. 630**

A Rotating Sanding Head carrying 32 brush backed abrasive strips is said to be suited particularly to burr irregular edges and to finish curved surfaces in metal work pieces. Application can be made, it is claimed, on molded parts, die castings, extruded shapes, stampings, and machined parts. **No. 631**

A Wire-Stitching Machine is reported with a new device enabling the operator to register his next staple position on the work in relation to a staple he has driven or to location marks previously placed. The machine itself makes its own staples from wire carried on a reel on the head. It drives the staples through the work and clinches them. This motor-driven machine is claimed to assemble metallic and non-metallic sheets rapidly and economically. **No. 632**

A New Plating Salt, employed in a solution of water and sodium cyanide is said to produce a white finish on brass, copper, silver, gold, iron and steel. The time required to apply the decorative finish is reported to be about one minute. Polishing is not required after plating. **No. 633**

PRODUCTS OF THE BRIDGEPORT BRASS COMPANY

Executive Offices: BRIDGEPORT 2, CONN.—Branch Offices and Warehouses in Principal Cities

SHEETS, ROLLS, STRIPS—*Brass, bronze, copper, Duronze,* for stamping, deep drawing, forming and spinning.

CONDENSER, HEAT EXCHANGER, SUGAR TUBES—For steam surface condensers, heat exchangers, oil refineries, and process industries.

PHONO-ELECTRIC* ALLOYS—High-strength bronze trolley, messenger wire and cable.

WELDING ROD—For repairing cast iron and steel, fabricating silicon bronze tanks.

LEDRITE* ROD—For making automatic screw machine products.

BRASS "Bridgeport" CONN.

Established 1865

BRASS, BRONZE, DURONZE WIRE—For cap and machine screws, wood screws, rivets, bolts, nuts.

DURONZE ALLOYS—High-strength silicon bronzes for corrosion-resistant connectors, marine hardware: *hot rolled sheets* for tanks, boilers, heaters, flues, ducts, flashings.

COPPER WATER TUBE.

FABRICATING SERVICE DEPT.—Engineering staff.

BRASS AND COPPER PIPE

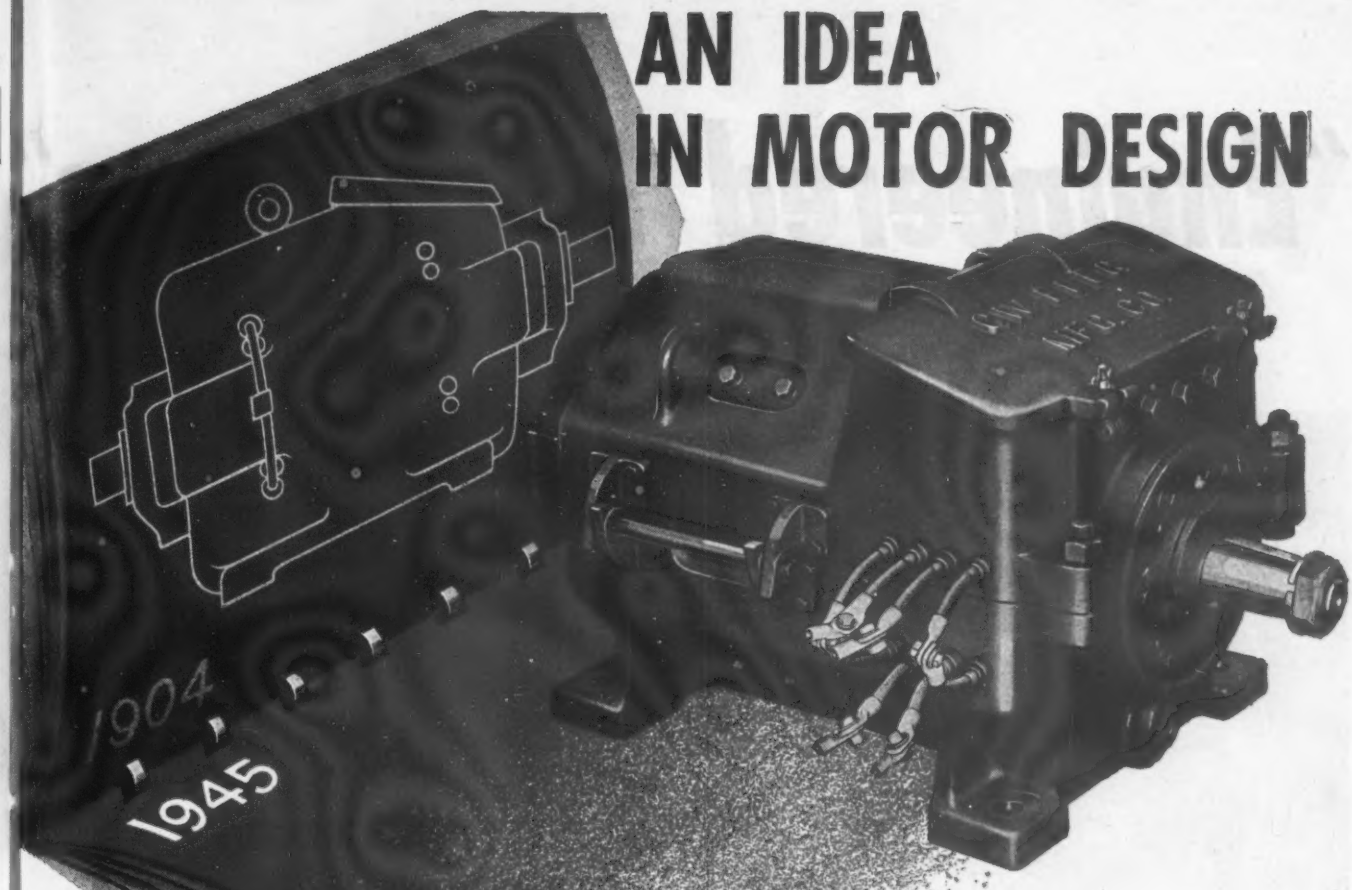
Note: Bridgeport products are supplied in accordance with existing priority regulations.

*Trade name.

BRIDGEPORT

BRASS

AN IDEA IN MOTOR DESIGN



pioneered 41 years ago

In 1904, Crocker-Wheeler built the first motors specifically designed for auxiliary drives in steel mills. For fully a decade, steel-mill engineers had been experimenting — trying to find a motor that could withstand heavy overloads, moisture, dust, fumes and terrific heat. Partially-enclosed, street railway motors were tried . . . and failed. Sooner or later their insulation proved inadequate.

Then Crocker-Wheeler engineers had an idea: Why not enclose the armature and windings completely, and strengthen the insulation to withstand the extreme temperatures? A motor was designed, built, tested, tried out . . . and proved a success.

Today, thousands of motors — following this same basic design idea—are in use throughout the world. Direct descendant of the original motor is the Crocker-Wheeler Type *Numerical "W"*— built to meet A.I.S.E. standardized dimensions and ratings.

Mica and glass insulate against heat, vacuum impregnation with high-grade varnish protects the windings from corrosive fumes; a thick steel housing keeps out dirt. Extremely low armature flywheel effect, permits rapid acceleration with minimum power loss. Deep commutator bars with wide solid risers assure long commutator life. Brazing eliminates possibility of loose field coil connections. Heavy malleable iron hinged inspection cover provides easy accessibility.

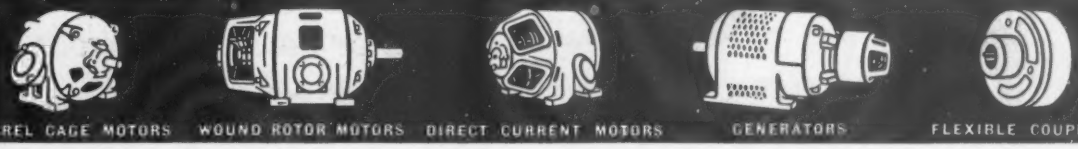
Send for complete details of Crocker-Wheeler mill motors. Please write on your company letterhead.

CW-6

CROCKER-WHEELER

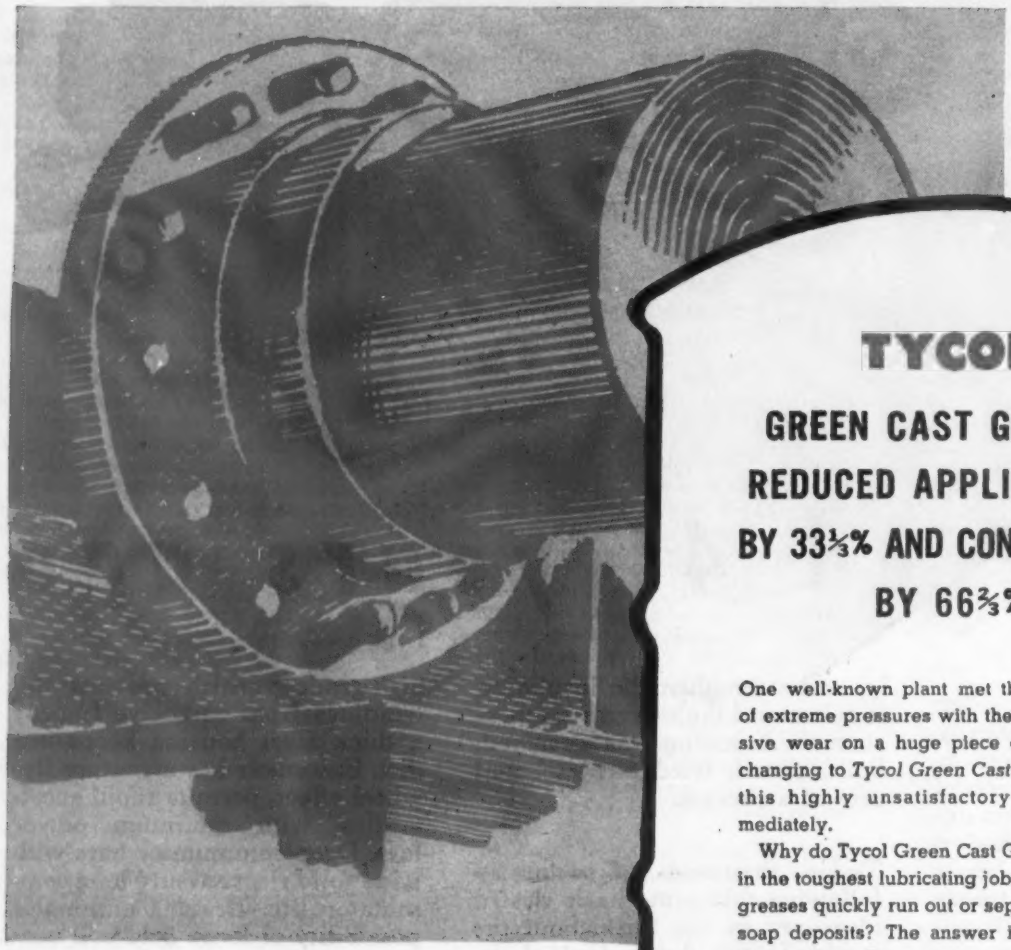
A DIVISION OF JOSHUA HENDY IRON WORKS, AMPERE 33, NEW JERSEY

Branch Offices: BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • SAN FRANCISCO • WASHINGTON



SQUIRREL CAGE MOTORS | WOUND ROTOR MOTORS | DIRECT CURRENT MOTORS | GENERATORS | FLEXIBLE COUPLINGS

"Engineered Lubrication"...



TYCOL

GREEN CAST GREASES REDUCED APPLICATIONS BY 33⅓% AND CONSUMPTION BY 66⅔%

One well-known plant met the usual trouble of extreme pressures with the resultant excessive wear on a huge piece of equipment — changing to *Tycol Green Cast Grease* stopped this highly unsatisfactory condition immediately.

Why do Tycol Green Cast Greases stand up in the toughest lubricating jobs — where other greases quickly run out or separate into caked soap deposits? The answer is simple. Tycol Green Cast Greases are made from high quality cylinder stock and well refined neutral oil combined with a minimum of soap for a given consistency. Green Cast Grease is water repellent . . . and is engineered to "take it" under all conditions.

A Tide Water Engineer will be glad to give you full information.

DRUMS! DRUMS! DRUMS!

War needs make it extremely important that all empty drums be returned as soon as possible.

INDUSTRIAL TYCOL GREASES

TIDE WATER A

MAKERS OF THE FAMOUS VEEDOL MOTOR OIL
Eastern Division:
17 Battery Place, New York 4, N. Y.

...the TYCOL way

CUTS DOWN REPAIRS...
SPEEDS UP PRODUCTION

If you want peak efficiency . . . low-cost operation — turn to Tycol "Engineered Lubrication" for all-important help in securing these results. Why? Because each Tycol lubricant is scientifically engineered to meet definite service conditions . . . to reduce wear and maintenance costs to a minimum. That's why so many successful operators have turned to Tycol for low-cost lubrication.

In developing this individualized line of lubricants, Tide Water has complete control over its own products — from oil field, through transportation, to refining. The most modern processes are used to refine selected crudes . . . to blend and compound Tycol's "specifically engineered" oils and greases.

For complete information regarding the specific oils and greases best suited to meet your requirements, call or write your nearest Tide Water Associated office. There a Tide Water engineer, thoroughly experienced in all phases of industrial lubrication, will give you the full benefit of his knowledge.

Have you received your copy of "Lubricania"?

This informative handbook, "Tide Water Associated Lubricania", gives clear, concise descriptions of the basic tests used to determine important lubrication properties — Pour Points, Viscosity, Neutralization, and many others. For your FREE copy write: Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.

ASSOCIATED OIL COMPANY

Principal Branch Offices:

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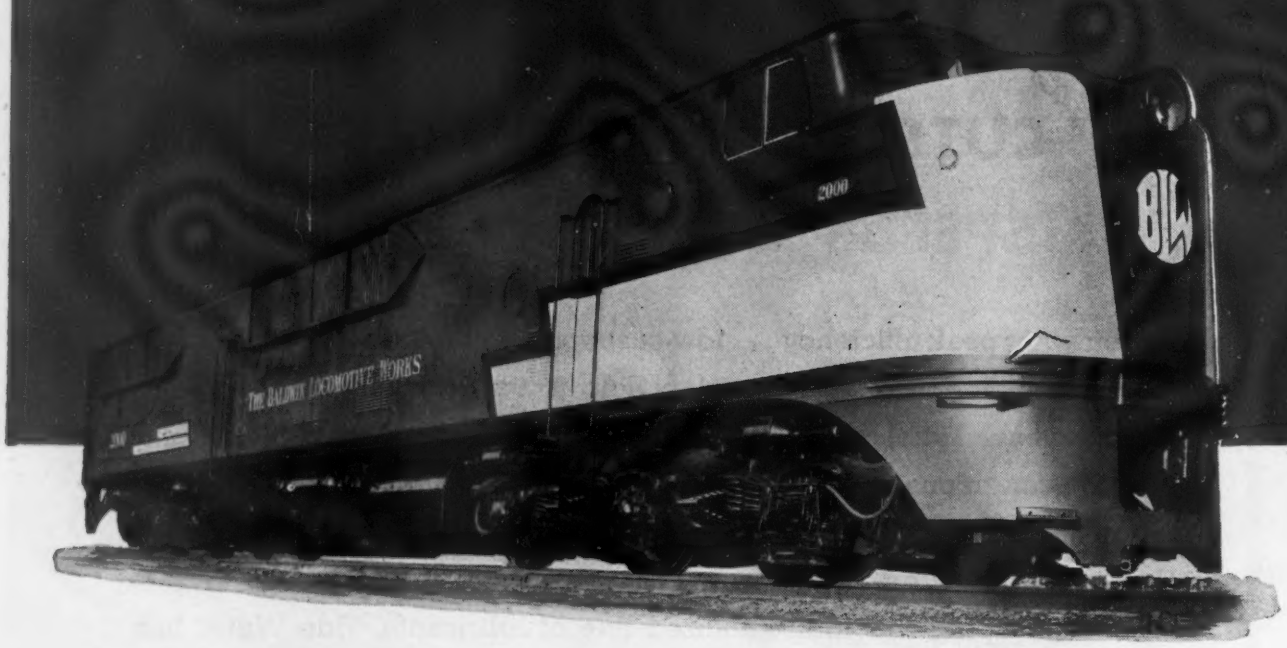
Headed for a long, long run



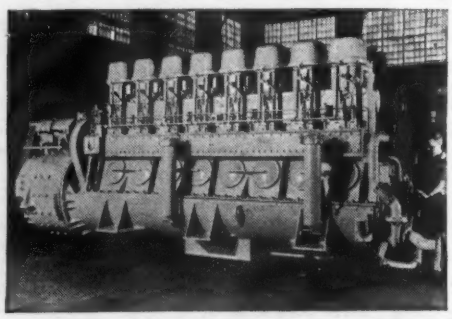
In their first Main Line Diesel, the Baldwin Locomotive Works have incorporated their long and successful experience in building rugged, sturdy switchers powered by Baldwin-built Diesel engines.

The longer life and lower maintenance costs obtained on the first liners Baldwin had processed with PORUS-KROME led them to standardize on this type of liner . . . and now every Baldwin Diesel engine coming off the production line has the greater reliability assured by PORUS-KROME. Of course, their first Main Line Diesel has PORUS-KROME applied to its liners, too, and thus it is headed for a long, long run of reliable operation.

PORUS-KROME is hard, pure chromium applied by the patented Van der Horst process. It has tiny pores and channels which serve as reservoirs for lubricating oil, feeding it back as needed. It greatly decreases the wear on bearing surfaces, and, when applied to cylinder walls, it multiplies their life 4 to 20 times . . . and the life of conventional rings 3 to 5 times.

In addition to providing a "long life" cylinder wall surface, PORUS-KROME has many diversified applications. If you have troublesome wear problems on any parts of your machines or equipment, or are seeking a way to give your customers an added value in your products, Van der Horst engineers may be able to supply the solution for you. Write today telling us just what your problems are . . . no obligation, of course.

Van der Horst Corporation of America, Olean, N. Y.
Plants in Olean and in Cleveland, Ohio



Two of these 1000 hp. Baldwin Diesel-Westinghouse generator units make up the power plant of the Baldwin Main Line Diesel. Cylinder liners are PORUS-KROME processed.

PORUS - KROME

Good for the Life of your Engines

VAN DER HORST

AN AFFILIATE OF DRESSER INDUSTRIES

Advertisement

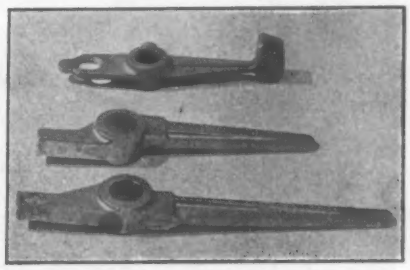
DIECASTING DIGEST

VIII — Die Castings Replace Forgings, Sand Castings and Permanent Mold Castings

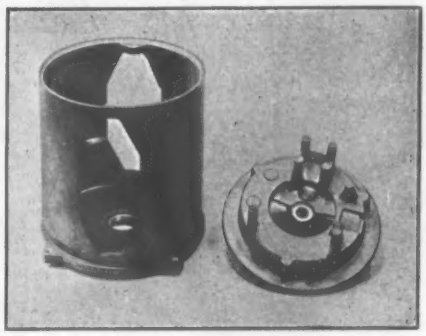
More and more non-ferrous alloy parts, formerly made by forging, sand casting or permanent mold casting, are now being die cast to satisfy critical military demands for rapid production, dimensional accuracy and best possible performance. Back of this trend are improvements in die casting machinery which have given military and civilian engineers confidence to design and specify die castings.

In many war plants, Lester-Phoenix die casting machines, equipped with high pressure pre-fill injection systems, are making aluminum castings which, only yesterday, were thought impossible to die cast. For instance, by die casting the three links shown below, Sperry Gyroscope Company saved weeks of precious time and obtained aluminum parts fully as satisfactory as those previously made by forging. Such parts are made by "slow-squeeze" injection, which packs metal into the die at comparatively low speed, permitting escape of air ahead of the metal, and then applies pressure (up to 33,000 psi) on the metal as it chills. This minimizes the formation of gas pockets and shrinkage voids (the causes of porosity in die castings) and produces sound die castings, with physical characteristics not otherwise obtainable.

Converted to Die Casting:



. . . from forging

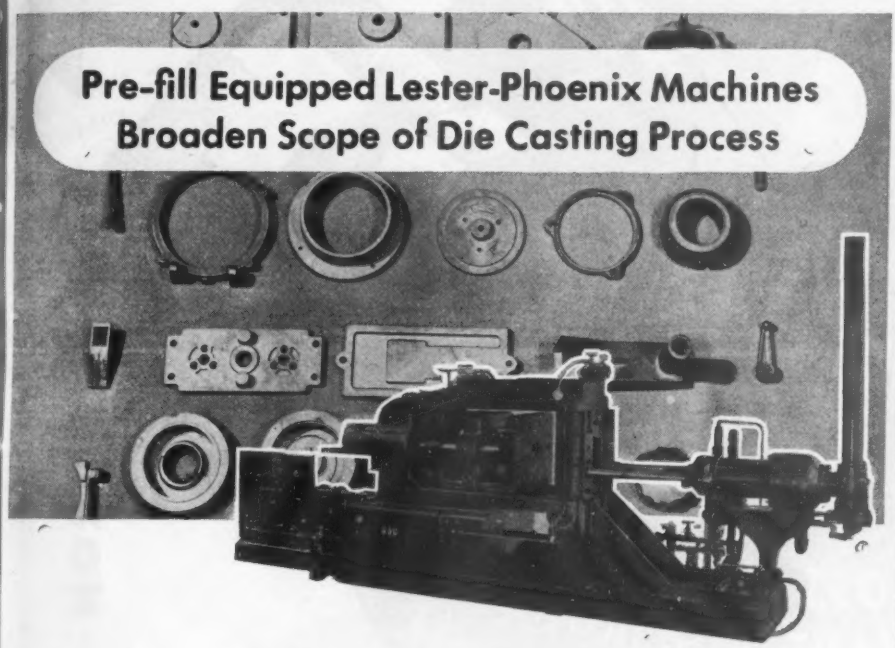


. . . from sand casting.

The other two aluminum die cast parts shown are a chassis (left) and a bracket for a Sperry stabilizing unit. The die castings replaced sand castings; now the parts are made in a fraction of the former time, with most of the chassis machining eliminated and with the bracket cast to close tolerances.

DIE CASTING DATA

The casting technique to produce such sound die castings is discussed in an article (now reprinted) by S. U. Siena, superintendent of the Sperry Gyroscope die casting department. Write today for your FREE copy. Lester-Phoenix, Inc. 2629 Church Avenue, Cleveland 13, Ohio.



Lester-Phoenix high-pressure die casting machines have demonstrated that die castings with strength and physical characteristics heretofore considered impossible can now be produced uniformly day after day.

They are making denser, stronger, smoother surfaced die castings; many larger than ever before, and equally important, *more castings at higher speed and lower cost.* They are constantly increasing the scope of the die casting process by giving their users confidence to convert to die casting from slower, more costly methods. For specific data on how you can cut your costs and improve your product, write to:

LESTER-PHOENIX, INC.
2629 Church Ave., Cleveland 13, Ohio

WRITE NOW!
FREE die casting information on Lester-Phoenix high-pressure die casting machines for zinc - tin - lead and aluminum-brass - magnesium alloys.

LESTER-PHOENIX
DIE CASTING MACHINES

• IRON ORE • PIG IRON • COAL • COKE •

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New York City—William R. Alley
Philadelphia, Pa.—Carson, Marshall & Co.
San Francisco and Los Angeles, California; Seattle and Tacoma, Washington; Portland, Oregon—
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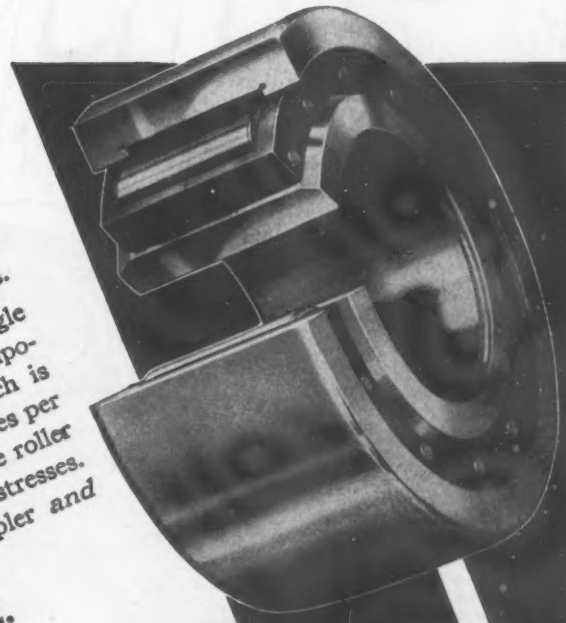
Choose Right-Angle Loading for Outstanding Performance . . .



● In many applications—particularly in heavy-duty service—Rollway Solid Cylindrical Roller Bearings outlast and outperform other types of bearings. There's more metal to carry the load . . . long line contact with the race . . . and lower unit pressures. A combination that affords from 3 to 5 times the carrying capacity of equal-sized ball bearings.

But that's only half of the story. Rollway Right-Angle Loading splits compound loads into the two simple components of *pure radial* and *pure thrust*—each of which is carried on a separate set of rollers. Total load magnitudes per bearing are lower, and are carried perpendicular to the roller axis. There are no oblique resultants, no complicated stresses. Stress analysis and bearing computations are simpler *and more exact.*

ROLLWAY BEARING CO., INC.
Syracuse, N. Y.

ROLLWAY RIGHT-ANGLE LOADING

● If you haven't a ROLLWAY BEARING CATALOG in your engineering file, write for one today. And ask our engineering specialists to help you in selection of the type and series best suited for your application. Just send a print of your assembly with specification of load, speed and type of service for confidential analysis. No charge. No obligation.

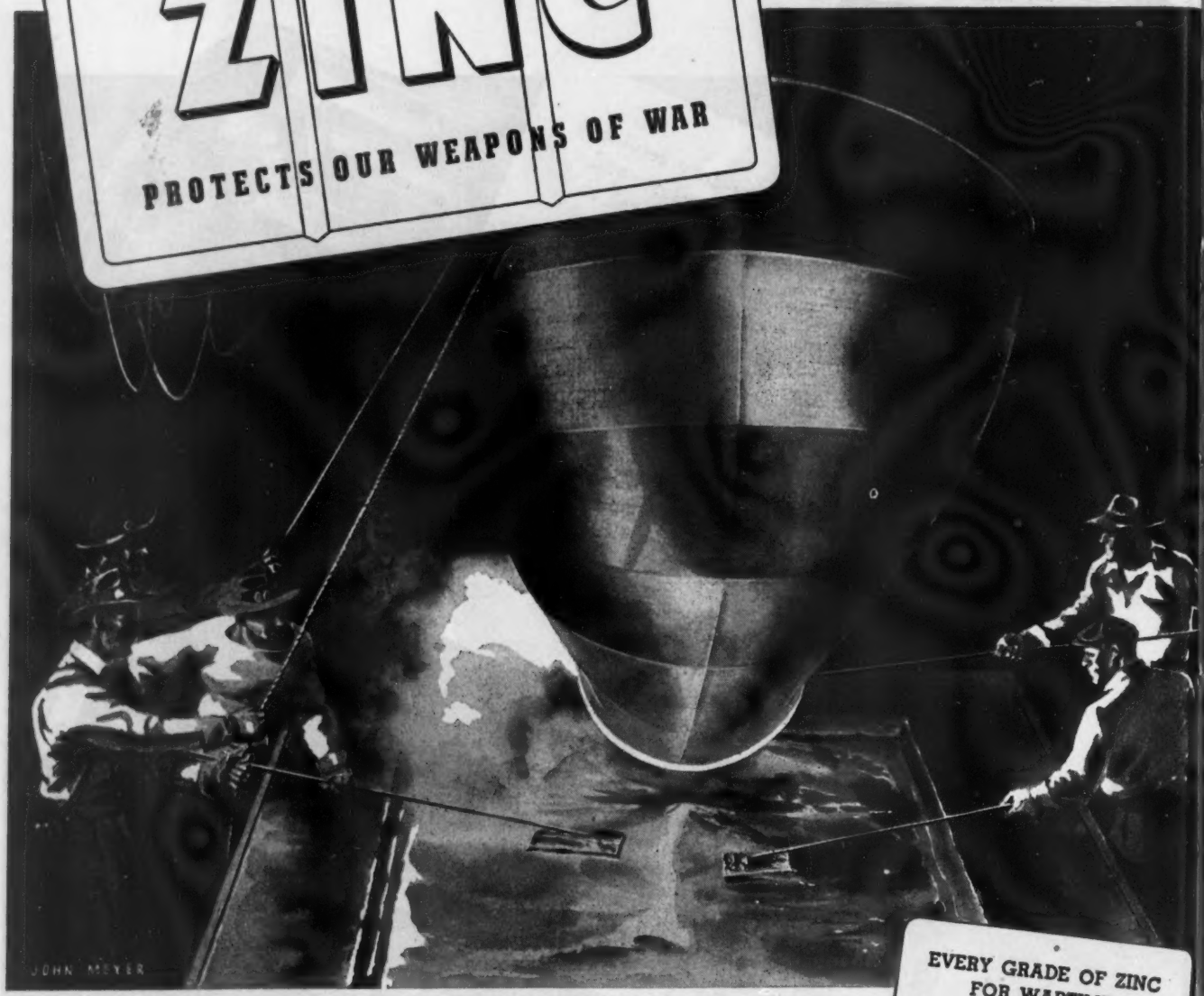
ROLLWAY
CYLINDRICAL ROLLER BEARINGS

SALES OFFICES: Philadelphia • Boston • Pittsburgh • Youngstown • Cleveland • Detroit • Chicago • St. Paul • Houston • Tulsa • Los Angeles

Galvanizing Ventilators for Liberty Ship

ZINC

PROTECTS OUR WEAPONS OF WAR



★ Wherever iron or steel is exposed to the attacks of rust and corrosion, galvanizing, or zinc coating, offers by far the best protection. Today zinc protects thousands of items of war equipment on land, sea and in the air . . . tomorrow zinc will serve equally well in the protection of thousands of peacetime products.

EVERY GRADE OF ZINC FOR WARTIME REQUIREMENTS

PRIME WESTERN

SELECT

BRASS SPECIAL

INTERMEDIATE

HIGH GRADE

SPECIAL HIGH GRADE

AMERICAN ZINC SALES COMPANY

Distributors for

AMERICAN ZINC, LEAD & SMELTING CO.

COLUMBUS, OHIO CHICAGO ST. LOUIS NEW YORK

WHAT A FEW COILS MEAN TO TRANSPORTATION—

TRANSPORTATION is taking a real pounding today, and that goes for Muehlhausen Springs, too.

On the functioning of these coils of wire rests, to no small degree, the ability of ships, planes, trucks and trains to keep supplies rolling.

The unfailing performance of these springs is no accident. Into their design goes a lot of engineering.

Look at the valve springs shown above. Their design seems simple enough, but notice the variations in coil pitch and diameter. These are to foil that arch foe of high-speed mechanisms—vibration.

By adding a coil here, varying pitch there, or changing the spring diameter, Muehlhausen engineers raise the spring's natural vibrating frequency high enough that it will not be excited at normal engine speeds. Of course, the job isn't as simple as that—not mentioned are the hours of study and the precision testing. Engineering of this type is keeping supplies rolling in time of war—and it will keep 'em rolling in the post-war period.

MUEHLHAUSEN SPRING CORPORATION

Division of Standard Steel Spring Company

921 MICHIGAN AVENUE • LOGANSPORT, INDIANA

To improve product performance, use

MUEHLHAUSEN

Designed

SPRINGS

FOR BROADEST CORROSION COVERAGE

Rely on These 2 "Key" Alloys

TWO "key" Lebanon alloys with their variants cover a high percentage of industry's corrosion-resistant requirements. Circle Ⓛ 23 meets general needs for castings not subjected to severe corrosive actions. Circle Ⓛ 22 provides a superior degree of resistance over a broader range of applications.

Important variants of these basic alloys are Circle Ⓛ 22-XM and Circle Ⓛ 22-M. Circle Ⓛ 22-XM carries molybdenum which provides additional protection against the actions of many chemicals. Circle Ⓛ 22-M carries selenium to facilitate machining (with some loss of corrosion resistance resulting).

All four of these Lebanon alloy steels provide outstanding service over a wide range of applications. Lebanon will gladly furnish coupons for corrosion tests. For specific recommendations, forward service histories or arrange for a study by a Lebanon metallurgist or foundry engineer.

LEBANON STEEL FOUNDRY — ORIGINAL AMERICAN LICENSEE GEORGE FISCHER (SWISS CHAMOTTE) METHOD

LEBANON, PA. — *"In The Lebanon Valley"*

This new bulletin combines data about Lebanon Circle Ⓛ 22 and Circle Ⓛ 23 (18-8 alloys) in a single, easy-to-use, file-size folder. You can quickly compare the basic alloys and their variants. Write today for your copy.

LEBANON CIRCLE Ⓛ 22 AND 23

Lebanon Designation	NOMINAL ANALYSES							NOMINAL PHYSICAL PROPERTIES			
	C.	Si.	Mn.	Cr.	Ni.	Mo.	Special	Tensile Strength	Yield Point	Elongation in 2"—%	Brinell Hardness
Ⓛ22	0.07 Max.	1.25	0.75	19.50	9.00			75,000	36,000	50	135
Ⓛ22-M	0.07 Max.	1.25	0.75	19.50	9.00		Se. 0.25	80,000	40,000	45	160
Ⓛ22-XM	0.07 Max.	1.25	0.75	19.50	10.00	2.25		82,000	42,000	50	170
Ⓛ23	0.20 Max.	1.25	0.75	19.50	9.00			75,000	36,000	45	140

Lebanon ALLOY AND STEEL Castings

WHEN YOU

CALL SALEM

ABOUT HEATING FURNACES

STEP 2

GO TO WORK!

VISUAL SPECIALISTS

You want the newest innovations and cost-cutting war ideas built into your new heating furnaces and allied equipment.

When you *call Salem,* a heating engineer discusses your requirements and passes along useful information derived from diversified experience during and before the war.

He returns to Salem, talks over your needs with Salem's staff of experienced heating men. Then he sends the visual experts into action, drafting up ideas.

After you have approved plans, working blueprints are prepared. Construction starts and the finished installation represents the most efficient heating or heat treating department you can buy.

Cutting your maintenance and operating costs begins with thorough planning between you and an experienced equipment manufacturer. That's why we suggest you CALL SALEM for heating furnaces or allied equipment.

Builders of the world's largest rotary forge furnace and originators of "Engineered Heat."

NOTE: Write for Salem's new 16-page, illustrated booklet—"Engineered Heat," complete with easy-to-use heating and temperature charts.

Salem Engineering Company builds all sizes and types of heating furnaces and allied equipment. Many heating innovations have been originated during the war. Salem can incorporate these cost-cutting ideas into your new heating furnaces and allied equipment. . . . CALL SALEM.

SALEM

ENGINEERING COMPANY

SALEM, OHIO

SALEM ENGINEERING COMPANY

Engineered Heat

WE RUN RINGS AROUND AN IDEA

. . . to Save Machining Costs

New ideas, new machines, often mean new and bolder demands on the art of ring fabrication so that machining costs may be brought within the realm of reason . . . a challenge which we have met as our stock in trade for more than half a century.

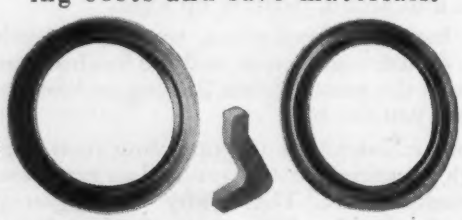
We have been making Dresser Couplings for 65 years . . . products which demand accurate fabrication through rolling, welding and sizing of many circular shapes . . . setting new standards for roundness, flatness, and flawless strength. Today this "know-how" is solving knotty design problems in urgent war production—and now is available to solve your problems.

Dresser has the equipment and engineering skill to produce rings of varied section up to 96 inches in diameter, depending on sectional dimensions . . . at such close tolerances that machining is reduced to a minimum. Send us your inquiry, or write for booklet "Rings for War".

Dresser Mfg. Division, Dresser Industries, Inc., Bradford, Pa.

Dresser Rings

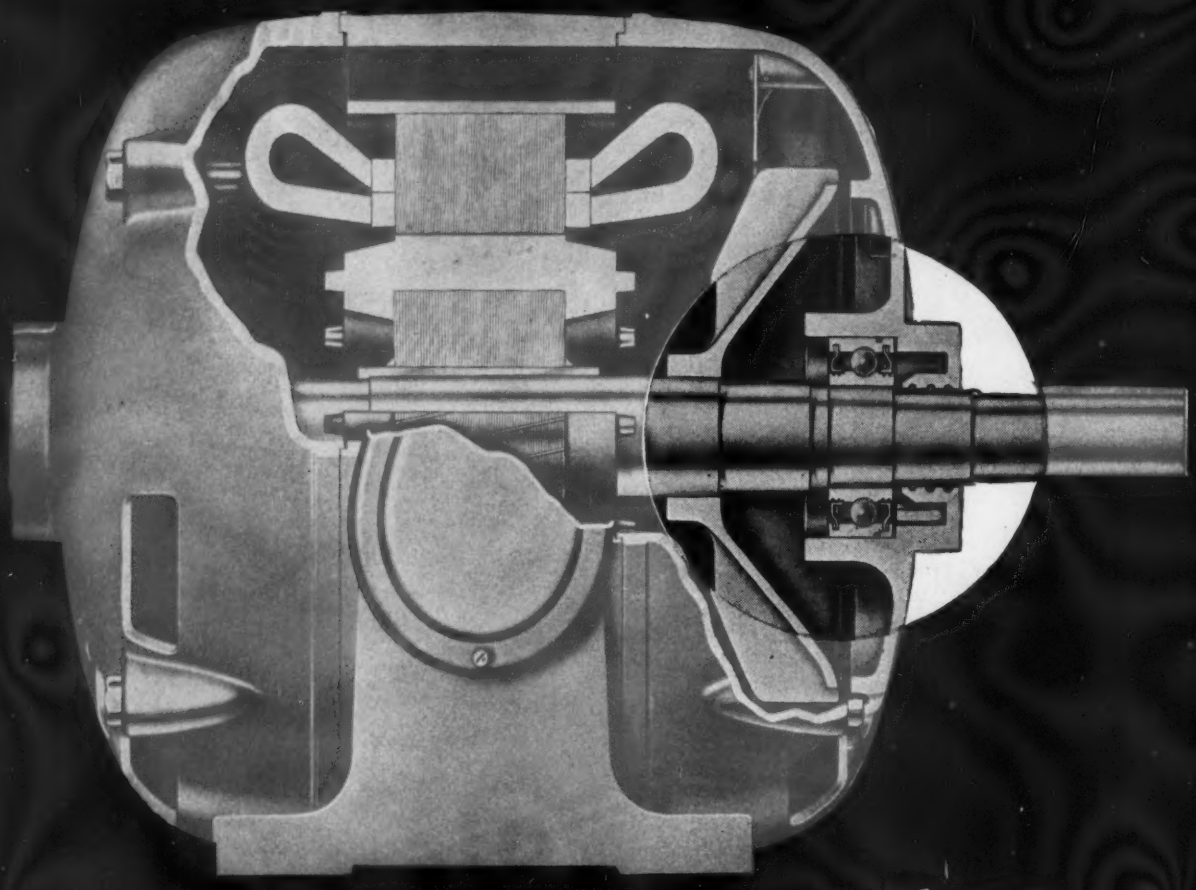
. . . a new way to lower machining costs and save materials.



Typical is this odd-section ring, which saves hours of machining time compared to conventional methods.

DRESSER RINGS and FORGINGS

Tons upon Tons of Experience
...from Sheet Lead
...to Apparatus
...to Acid Recovery Plants
Making acid behave—that's National Lead's long suit.
In every field handling corrosive chemicals—in thousands of installations—National Lead has accumulated a storehouse of knowledge that means it will pay you to Go "National" for Lead.
FOR EXAMPLE:
1. More than 200 complete sulfuric acid recovery plants have been built for industry—from plan to finished structure...
2. Acid-handling equipment of all kinds has been designed ... including all-lead, lead lined or covered valves, pipe, fittings ...and special homogeneous lead-bonded apparatus fabricated to specification ...
3. National Lead pioneered Tellurium Lead for pipe and sheet, giving improved corrosion resistance at elevated temperatures and greater ability to withstand vibratory stress ... and of course, has long furnished sheet, pipe, coils and fittings of chemical lead and of antimonial lead.
No matter what your needs, remember ... Go "National" for Lead.
Go "National" for Lead
NATIONAL LEAD COMPANY
111 Broadway, New York 6, N. Y.
Offices and Plants in Principal Cities and Canada
Mills-Packard chamber plant of U. S. Phosphoric Products Division, Tennessee Corp., built after Pearl Harbor to help meet the urgent need for wartime acid. The O. G. Kelly Company of Boston handled the lead erection and burning. 850 tons of lead were required for the 20 chambers.



these Westinghouse motors will run twenty-four hours a day— for five years or more— with no greasing

eliminates frequent bearing lubrication

THE BIGGEST ITEM OF MOTOR MAINTENANCE

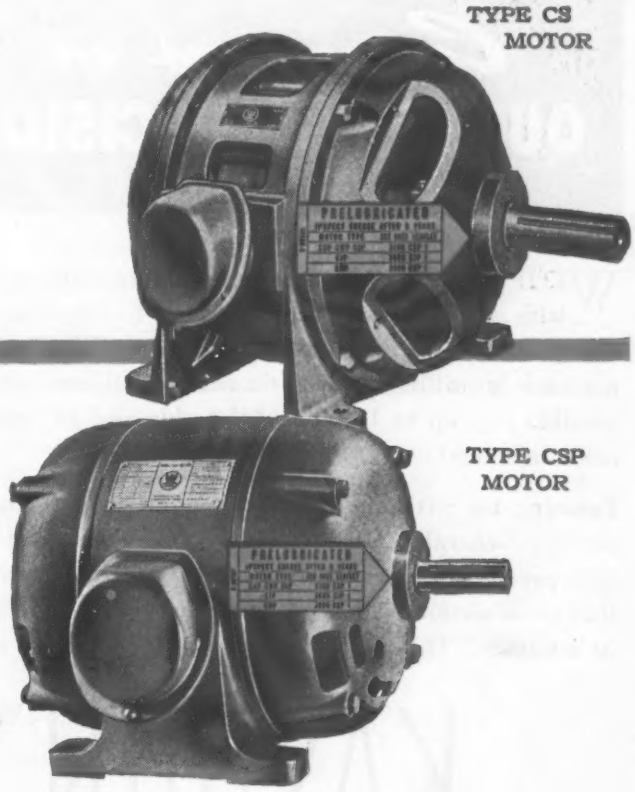
Another great step forward in the design of squirrel-cage motors of 15 horsepower and under (frames 326 and smaller) is being offered by Westinghouse. It's the Prelubricated Ball Bearing.

Instead of the periodical lubrication required by the bearings in conventional motors, the lubrication of these bearings can be forgotten for five years or more, even *when operating 24 hours a day*. The saving in time of maintenance crews is obvious, but there are other important advantages, too:

No overgreasing
No "skipped" bearings
No grease contamination
No grease seepage
No unreplaced pipe plugs

All these add up to longer bearing life and smoother motor operation through years of continuous service. For complete information, write for Bulletin B-3554 and Descriptive Bulletins 3100-CSP and 3100-1 to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21342

TYPE CS MOTOR



TYPE CSP MOTOR

WESTINGHOUSE SPECIAL FEATURES

- **PRELUBRICATED SEALED BALL BEARINGS** reduce lubrication maintenance . . . assure longer grease life . . . eliminate extensive lubrication records.
- **IMPROVED TUFFERNELL INSULATION.**
- **DYNAMICALLY BALANCED ROTOR.**
- **DIE-CAST ROTOR** with over-size fan.

Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

WESTINGHOUSE SQUIRREL-CAGE MOTORS

Contact KAYDON *of Muskegon*

FOR ALL TYPES OF BALL AND ROLLER BEARINGS 4" BORE TO 120" OUTSIDE DIAMETER

The huge spindle of this 13-ton SMALLEY-GENERAL Thread Miller runs in Special KAYDON Tapered Roller Bearings, 24x30x2.125".
THE NO. 44 MB SMALLEY-GENERAL MASTER THREAD MILLER USES KAYDON PRECISION TAPER BEARINGS

Companions in QUALITY *and* PRECISION

WITH its 18½" hole through main spindle, and with sufficient swing to take care of 8" Howitzers, 155 m/m and 4.7 guns, this SMALLEY-GENERAL machine is milling threads formerly considered impossible . . . up to 1" pitch, 34" inside and 24" outside diameters!

Teaming up with thread-miller engineers of the Smalley-General Company, KAYDON made the special high-precision tapered roller bearings with a very thin cross section, which presented unusual problems in accuracy. This successful teamwork is typical of progress that can be achieved by experienced "companions in quality and precision".

KAYDON, specializing in engineering and production of all types and sizes of ball and roller bearings from 4" bore to 120" O.D., also offers complete facilities for atmospheric controlled heat treating, flame hardening, precision heat treating, salt bath high speed tool hardening, microscopy, physical testing, and metallurgical laboratory services.

Counsel in confidence with KAYDON. Capacity is available now for production of all types and sizes of KAYDON Bearings. Look ahead — plan ahead — with KAYDON.

KAYDON *Types of Standard or Special Bearings:*

Spherical Roller • Taper Roller
Ball Radial • Ball Thrust
Roller Radial • Roller Thrust

THE KAYDON ENGINEERING CORP.

MUSKEGON · MICHIGAN

New in Name . . . Old in Experience

THE permanent mold process for aluminum alloy castings, as perfected at Permite, has eliminated machining operations entirely for many castings, and for others has reduced finishing work to the minimum.

Permite Permanent Mold Castings are **precision made** to tolerances as close as ±.010". There's less "dead" metal to remove. Time, labor and money are saved!

In addition to their precision tolerances, these castings have smooth surfaces and finer grain structures . . . are made to the highest standards of strength and uniformity.

Whatever your requirements in castings — permanent, semi-permanent, sand mold or die cast — Permite Engineers and Foundrymen place at your service their twenty-five years of experience in working with aluminum alloys. Let us show you how Permite Aluminum Alloy Castings may save you money.

ALUMINUM INDUSTRIES, Inc.

CINCINNATI 25, OHIO

Detroit: **809 New Center Building**

Chicago: **616 South Michigan Avenue**

New York: **9 Rockefeller Plaza**

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PERMITE ALUMINUM ALLOY CASTINGS

HOW TO GET RID OF AN ALUMINUM FABRICATION PROBLEM

CAN YOU MAKE THIS SPOT WELDED CONTROL BOX FOR US? WE DON'T HAVE THE FACILITIES.
SURE WE CAN. ALUMINUM SPOT WELDING IS RIGHT DOWN OUR ALLEY. HOW SOON DO YOU NEED DELIVERY?

When you have a job that calls for precision aluminum fabrication, remember that we're set up to provide specialized equipment and manpower on a basis to exactly fit your needs. Take spot welding for example, *just one of our many facilities:*

We have a battery of machines for this work, with capacities up to 4,000 volts and 3,200 lb. pressures. These machines can handle all alloys of aluminum up to 2 pieces of .125 thickness each. Preparatory cleaning is done by an improved method. Pull and etched tests are made at frequent intervals.

Our 34-year record of satisfactory performance is assurance you'll get what you want, when you want it. We serve many of America's leading manufacturers, and would like nothing better than to have you check with any of them on our ability to "deliver the goods".

Write or phone if you believe we might be able to serve you. We'll appreciate the chance to work with you on your production problems.

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SCREEN COMPANY
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OUR FACILITIES INCLUDE:

Stamping • Spot Welding • Drawing • Induction Brazing
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Spraying • Gas Welding • Baked Enameling • Tools and Dies

Write for this booklet today

It describes our facilities in detail, pictures many of the products we make, and explains how the Orange Screen Company can be a profitable cog in your manufacturing program. A request on your company letterhead is sufficient to start the booklet on its way to you.

Hansen

MODERN *STREAMLINE* COUPLINGS

SAVE TIME! • SAVE MONEY! • SAVE MATERIAL!

Hansen Couplings are streamlined for speed, ease of operation, low cost and peak production. To meet tomorrow's keen competition short cuts in production have to be made in the way of time saving on production, man hour savings and savings in material.

Hansen Couplings save all along the line because they are simple and easy to install and to operate. Take for instance the Hansen Push-Tite air coupling, a slight push of plug into socket, coupling is connected and air is automatically turned on. To disconnect operator merely slides sleeve back with thumb, plug is ejected and air is automatically turned off. Operator connects and disconnets air line right at his bench, no wastage of his time going back and forth to connect or disconnect or to turn air on or off. Full swivel action prevents kinking of hose.

Hansen Couplings will handle pressures up to 10,000 pounds without leaking, saving considerable volume of air which is costly.

Hansen streamlined couplings are far in advance of the field and cut down operating time and cost while boosting the production volume. Send for the Hansen industrial catalogue—it's free.

THE HANSEN MANUFACTURING CO.

1786 EAST 27th STREET • CLEVELAND 14, OHIO

THE EASIEST-TO-USE DIE HEAD ... and the Fastest

Here is an improved NAMCO non-rotating DIE HEAD that "streamlines" the whole thread-cutting operation —brings new ease of operation and convenience—shortens idle time—gets more work done.

Open or Close from any position

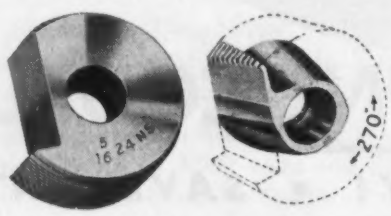
Close die by a quarter-turn from open position, in *either* direction. Handle is always in easy reach no matter where die head is positioned on machine.

Replace Chasers in *Seconds*

Merely lift the handle and chasers, mounted on blocks, slide out of grooves. From dull to sharp chasers is a matter of a few seconds—no screws to loosen or tighten—no change of precision.

The Circular Chaser Principle

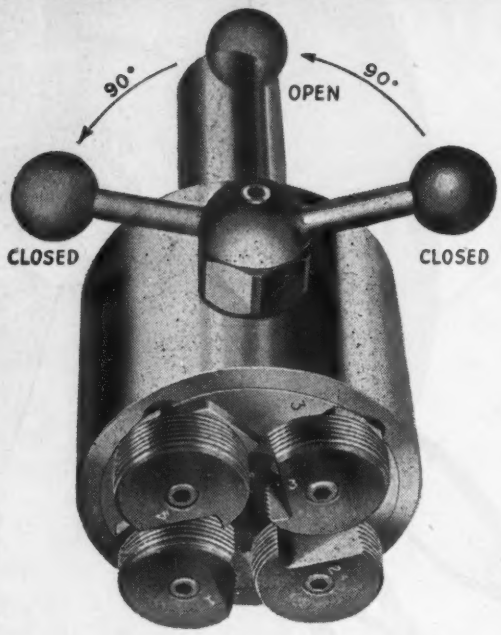
Namco Circular Chasers have proved their ability to produce more precision work. They eliminate trial cuts—the first piece is *production*—uniform precision insured throughout long runs.



Circular chasers may be ground through 270° circumference, increasing chaser life 10 to 50 times longer than other types.

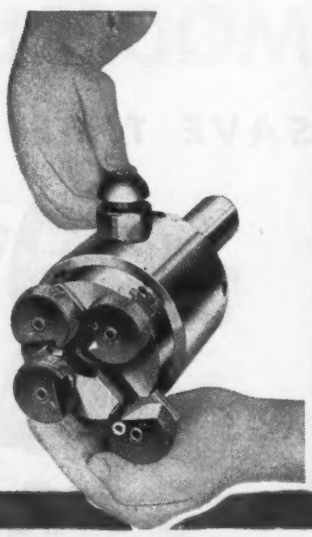
Here is your complete data

The new Namco Die and Tap Catalog, D-42-B, gives you all details of Namco tools for high-speed precision work. Send for your copy.



Open and close with 90° turn of handle, in *either* direction.

Lift handle to remove chasers . . . no screws to turn, no adjustment to make.



The NATIONAL ACME CO.

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Acme-Gridley 4-6 and 8 Spindle Bar and Chucking Automatics • Single Spindle Automatics • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

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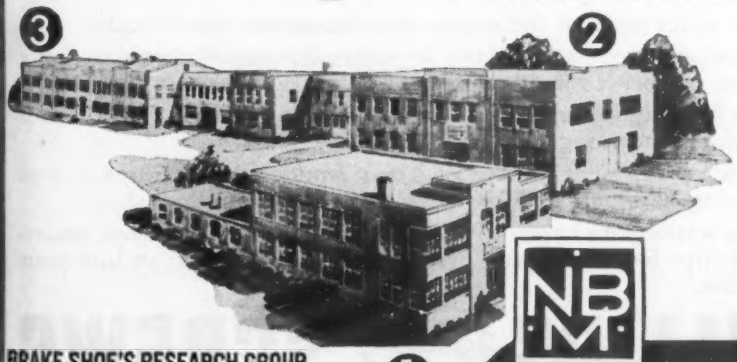
REPLACEMENT
REPAIR

Our experimental non-ferrous foundry and metallurgical laboratories are expertly equipped to help you solve these problems. You will find our large staff of resourceful and experienced metallurgists and engineers always willing to assist you.

When time means money, it pays to know a reliable resource:



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BRONZE CASTINGS IN ALL ALLOYS, SHAPES, AND SIZES

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DAMAGE EXPELLER!

While using slotted screws, work-spoiling driver skids were causing frequent damage to plastic shades in the assembly of desk lamps. Refinishing slowed down production, and spoilage boosted costs . . . until the manufacturer started using Phillips Recessed Head Screws.

OUTPUT IMPELLER!

With the change to Phillips Screws, damage and delays were eliminated. And with no more worry about driver skids, power drivers could be used, speeding output further. Costs came tumbling down . . . production set new records.

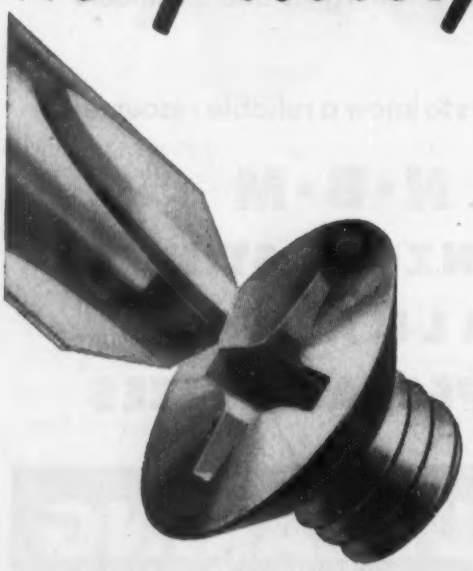
PROBLEM DISPELLER!

Phillips Recessed Head Screws, engineered to take heavier driving pressures, simplify product design, give it more strength, more rigidity . . . often with the use of fewer screws. Screw-driving is faster, easier, surer . . . permits design innovations slotted screws just can't touch.

SALES PROPELLER!

The Phillips Recessed Head radiates quality. It's trimmer . . . smarter looking . . . modern as tomorrow. No unsightly burrs and uneven appearance to cool off interested prospects. Put the extra sales push of Phillips Screws behind your product . . . make *good* merchandise look *better!*

It's Phillips — the engineered recess!



In the Phillips Recess, mechanical principles are so correctly applied that every angle, plane, and dimension contributes fully to screw-driving efficiency.

. . . It's the exact pitch of the angles that eliminates driver skids.

. . . It's the engineered design of the 16 planes that makes it easy to apply full turning power – without reaming.

. . . It's the "just-right" depth of recess that enables Phillips Screw Heads to take heaviest driving pressures.

With such precise engineering, is it any wonder that Phillips Screws speed driving as much as 50% – cut costs correspondingly?

To give workers a chance to do their best, give them faster, easier-driving Phillips Recessed Head Screws. Plan Phillips Screws into your product now.

PHILLIPS *Recessed Head* SCREWS

WOOD SCREWS • MACHINE SCREWS • SELF-TAPPING SCREWS • STOVE BOLTS

Made in all sizes, types and head styles

25 SOURCES

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The Bristol Co., Waterbury, Conn.
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The Corbin Screw Corp., New Britain, Conn.
General Screw Mfg. Co., Chicago, Ill.
The H. M. Harper Co., Chicago, Ill.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
Manufacturers Screw Products, Chicago, Ill.
Milford Rivet and Machine Co., Milford, Conn.
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N. H.
Parker-Kalon Corp., New York, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.
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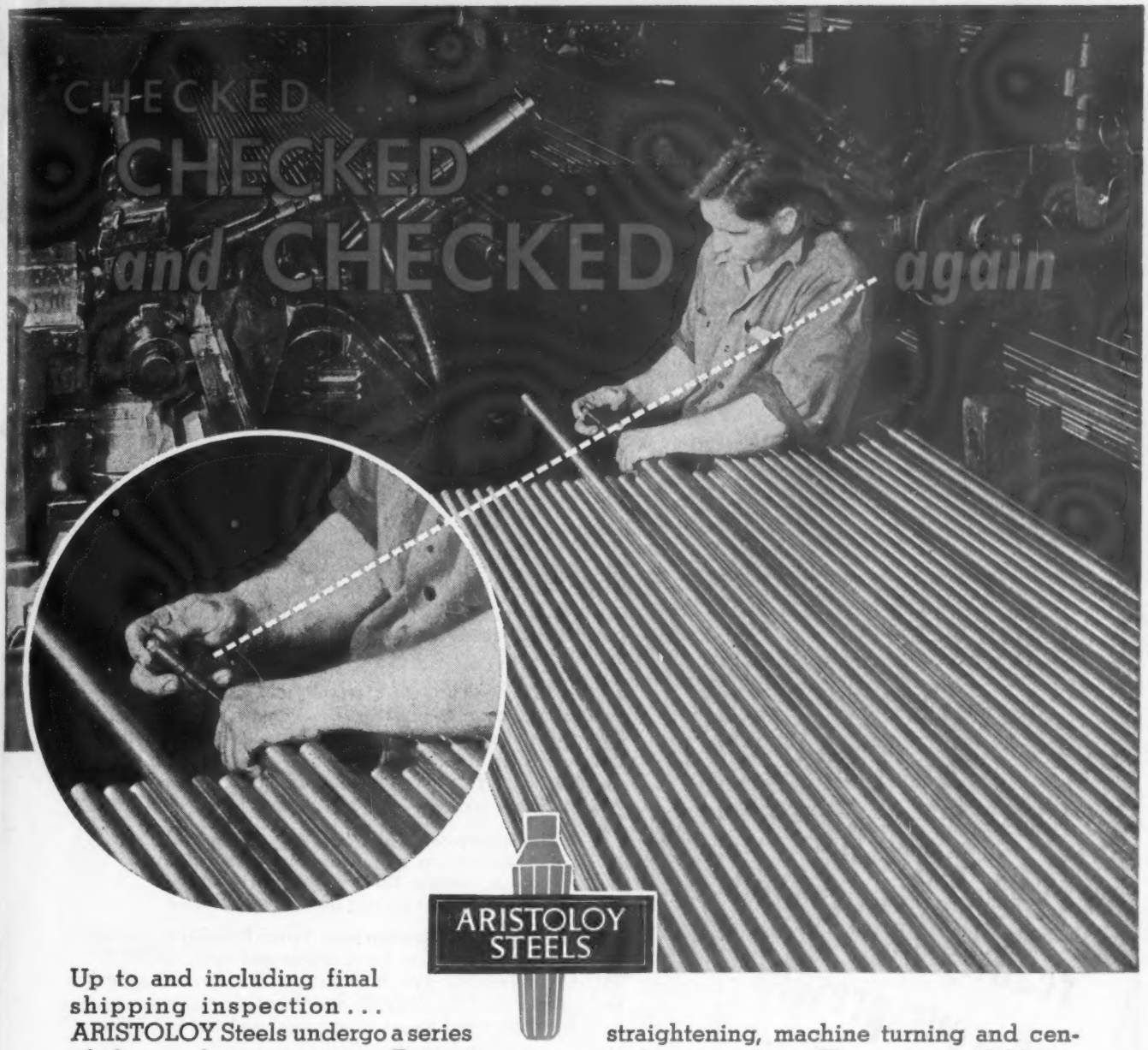
The Southington Hardware Mfg. Co., Southington, Conn.
The Steel Company of Canada Ltd., Hamilton, Canada
Wolverine Bolt Co., Detroit, Mich.



Up to and including final shipping inspection . . . ARISTOLOY Steels undergo a series of thorough inspections. Expert chemists, metallurgists and inspectors are constantly on the alert to detect even the slightest imperfections. Thus, when you receive ARISTOLOY Steel you know it is the finest obtainable.

ARISTOLOY Cold Finished Steels are produced as required by any combination of the following operations: controlled atmosphere annealing, pickling, drawing, straightening, machine turning and centerless grinding. They are available in practically all types of analyses in three different finishes: cold drawn, turned, and ground. Bars may be rough turned, smooth turned, or turned and polished.

Your Copperweld representative will gladly explain how it would be to your advantage to make Copperweld your source of supply for all electric furnace alloy steels.

ARISTOLOY STEELS

ELECTRIC FURNACE ALLOY

STANDARD STRUCTURAL ALLOY STEELS • MAGNAFLUX-AIRCRAFT QUALITY STEELS • BEARING QUALITY STEELS
CARBON TOOL STEELS • ALLOY TOOL STEELS • STAINLESS STEELS • NITRALLOY STEELS • SPECIALTY STEELS

COPPERWELD STEEL COMPANY • WARREN, OHIO

ARISTOLOY STEEL INTERNATIONAL COMPANY • EXPORT DIVISION • 815 FIFTEENTH STREET, N. W., WASHINGTON, D. C.

Here's something that should please the boss, the stockholders, the foreman, and ... the MAN THAT DOES THE WORK

GRANITE CITY SUPERBOND STAINLESS-CLAD STEEL CAN BE readily Fabricated on your present mild Steel Equipment

With increasing uses being found for stainless-clad steel, the development by Granite City Steel Company of SUPERBOND, the stainless-clad steel that can be more easily formed, punched, beaded and fabricated on your present equipment designed for mild steel, is of great value to you.

In Addition—Through complete laboratory control of your order, Granite City Steel Company helps hold rejects to an absolute minimum. First, tests are run to find the perfect clad and composition to suit your use, thus assuring you of economy in the original cost by giving you the *exact* stainless-clad to fit *your* job.

The laboratory control continues throughout production and into your fabrication process, adding value to the product by giving it greater lasting quality and service.

The Bond That Guarantees Your Product—Long after your product has been made and sold, SUPERBOND continues to give it that *extra*—hidden value. For every sheet of SUPERBOND Stainless-Clad has a *permanent* bond between the stainless steel and the mild that permits no separation of clad.

Send for this Booklet

which contains complete information and technical data on SUPERBOND Stainless-Clad Steel.

Granite City Steel Company

Granite City, Illinois

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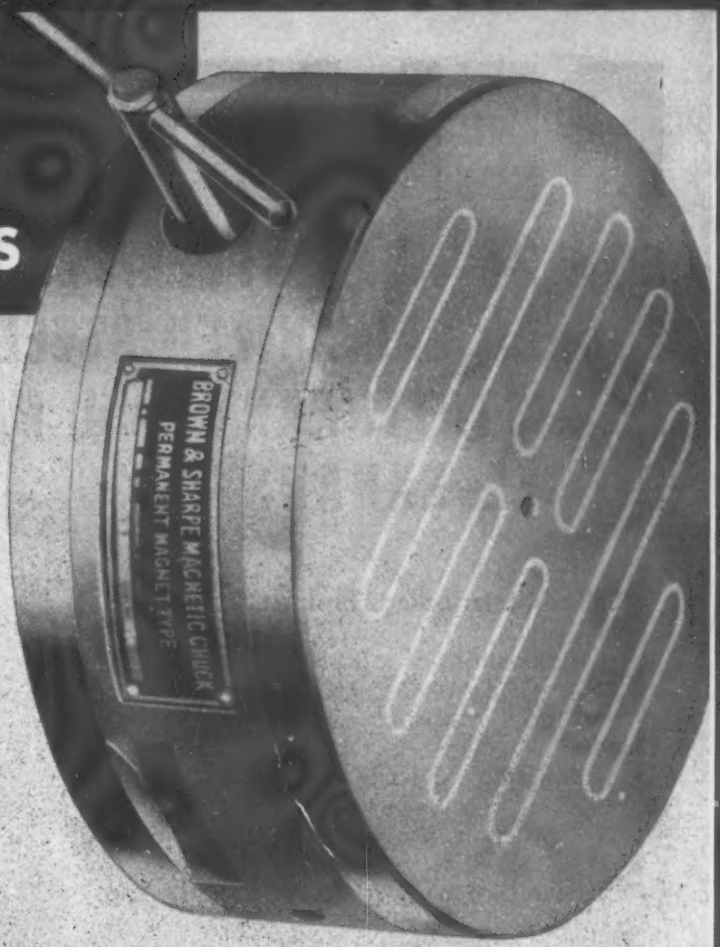
HOT ROLLED SHEETS • COLD ROLLED SHEETS • STRIPLATES • STAINLESS-CLAD • TIN PLATE • TERNE PLATE • ELECTRICAL SHEETS • TIN MILL PRODUCTS • PORCELAIN ENAMELING SHEETS

No Wires
No Heating
No Operating Costs

BROWN & SHARPE
PERMANENT MAGNET CHUCKS

. . . ready for instant use on any machine of suitable size as well as on work bench or surface plate. No electrical connections of any kind are needed. Send for complete catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

For sale only in the United States of America and its Territories and in Canada.



ROTARY MODEL

For use on grinding machines and for holding work for light cuts on lathes.

No. 9R — 9" in Diam.

RECTANGULAR MODELS

For use on surface grinding machines — also, for holding work for light milling and planing operations and for bench work.

No.	Size, In.	No.	Size, In.
*255	2⅞ x 5¼	824	8⅜ x 24⅞
510	5⅜ x 10⅜	1236	12⅛ x 36
618	6⅜ x 18⅛		

*Differs from illustration

. . . We urge buying through the Distributor

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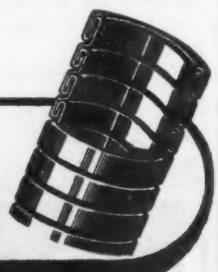

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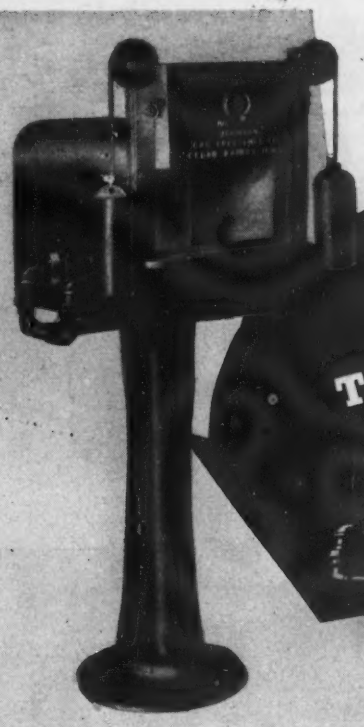

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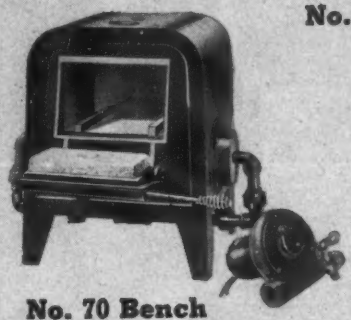

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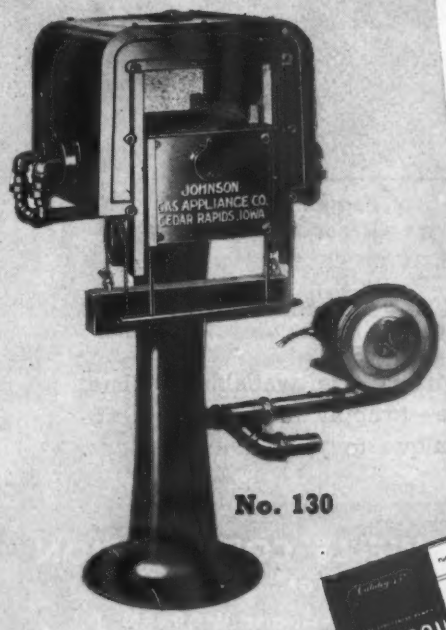

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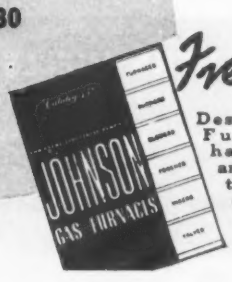

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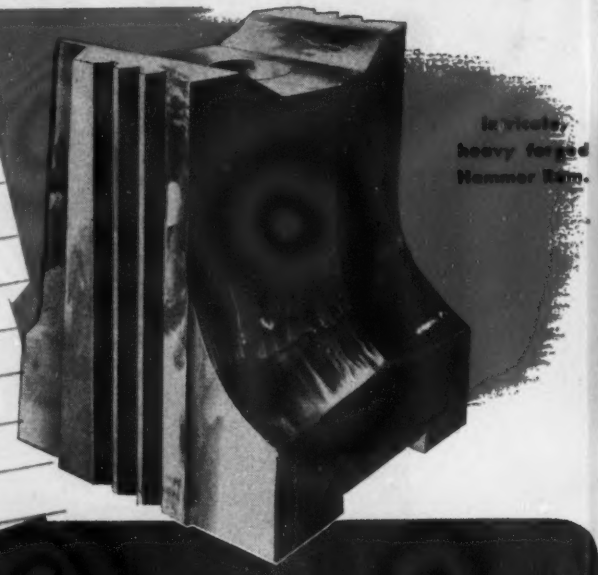

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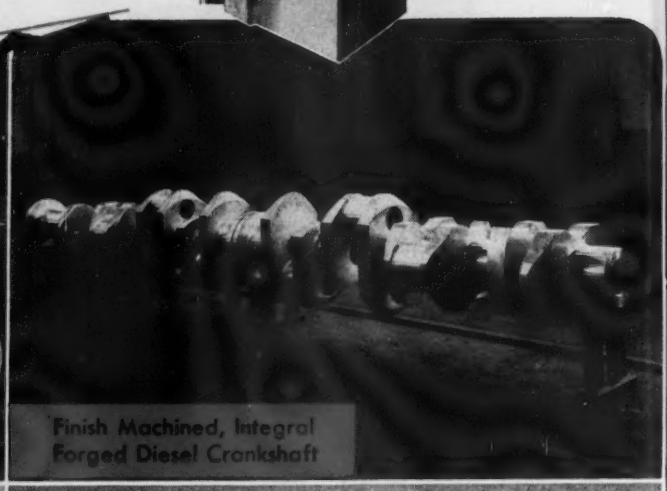

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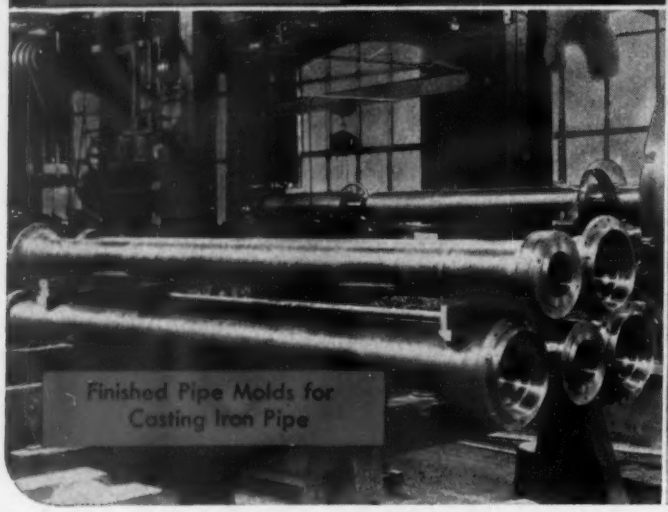

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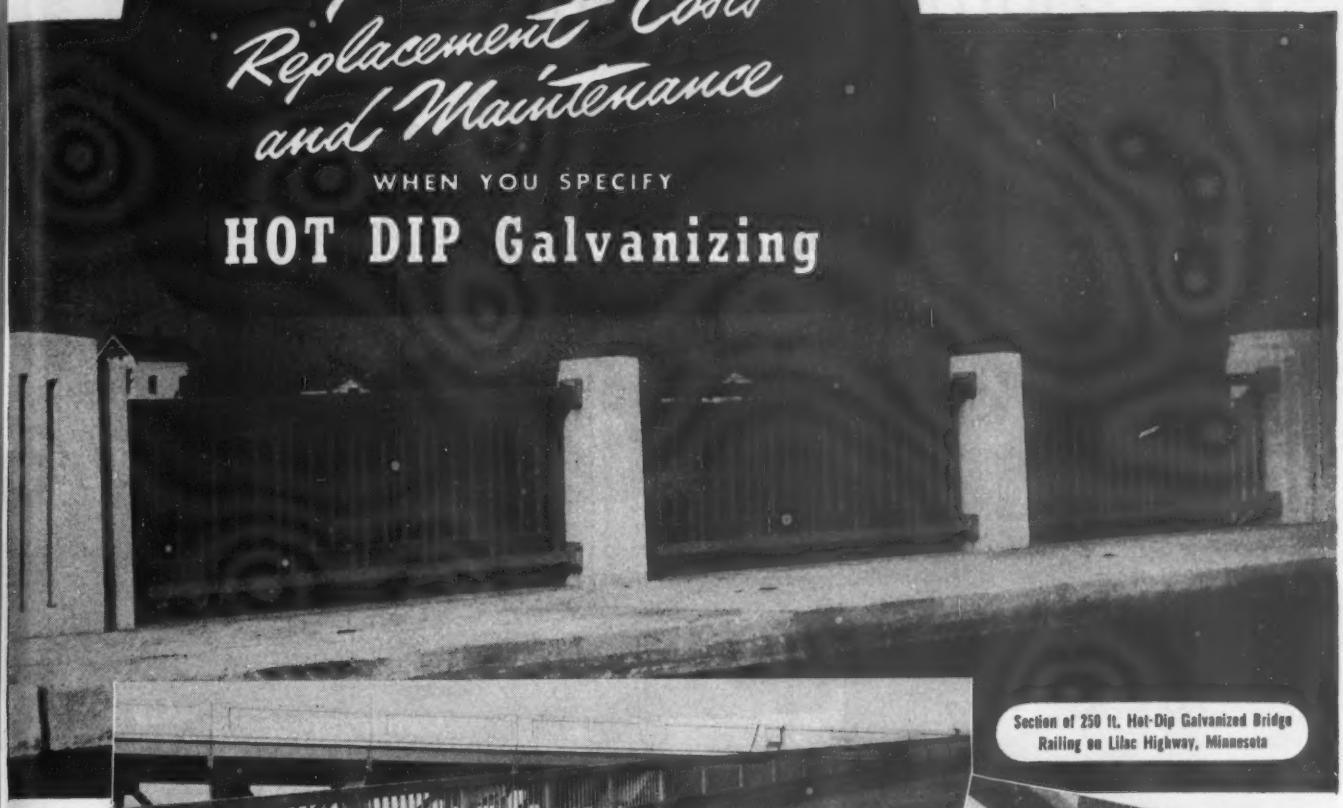
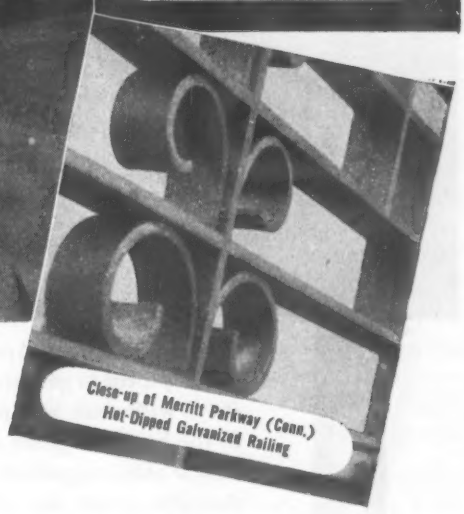


Section of 250 ft. Hot-Dip Galvanized Bridge Railing on Lilac Highway, Minnesota

Hot-Dip Galvanized Railing on approach to Golden Gate Bridge, San Francisco



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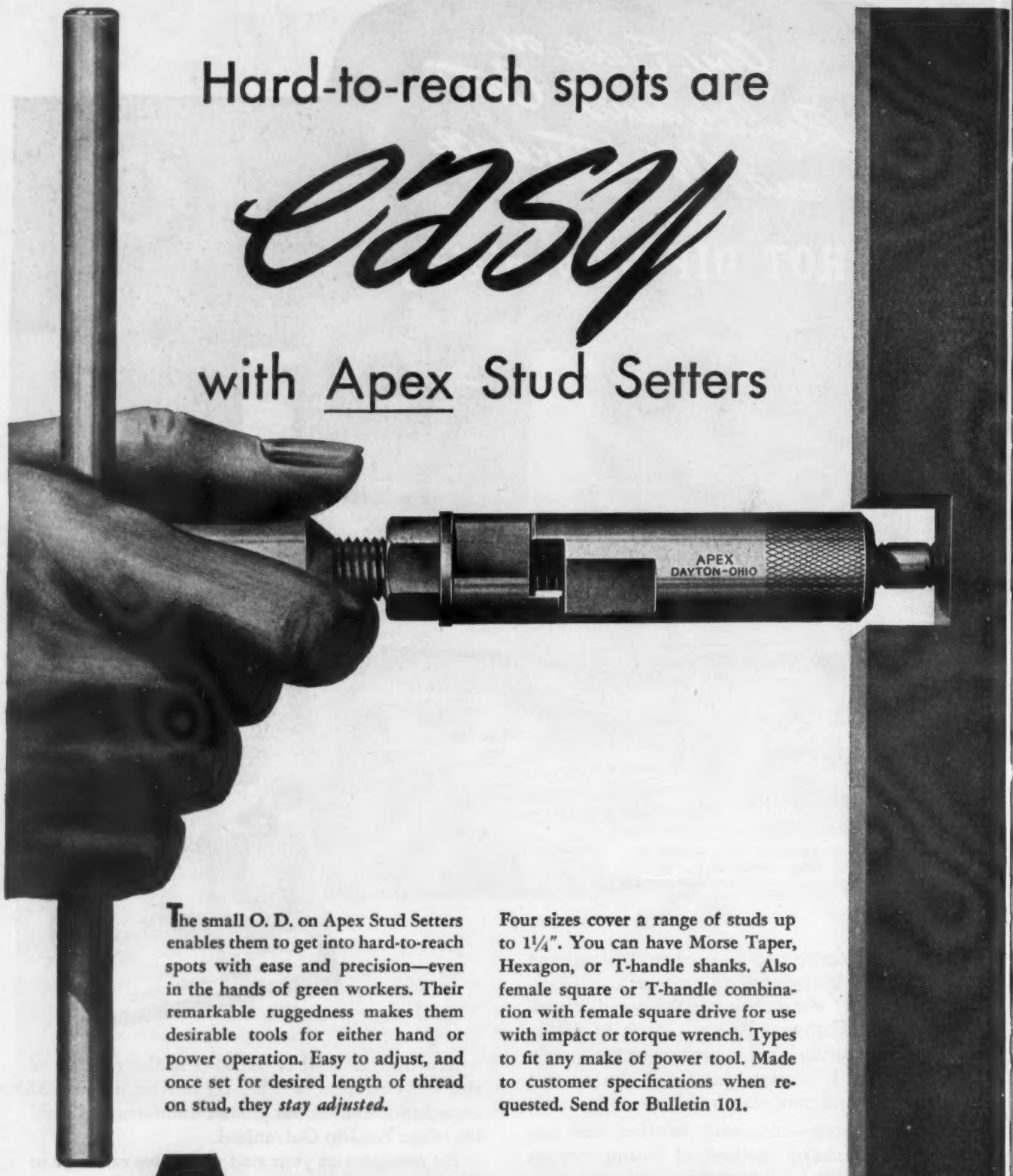

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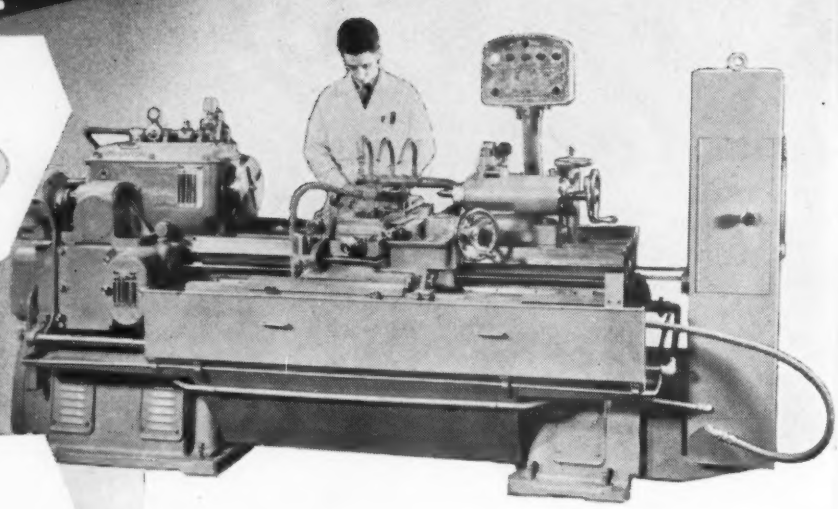

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STEEL

The Magazine of Metalworking and Metalproducing

VOL. 117, NO. 11 SEPT. 10, 1945

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STEEL
September 10, 1945

Object Lesson!

Now that Japan has surrendered formally and occupation of the enemy's territory is progressing smoothly, one can look back over the events of the two wars and examine the points of our weakness and strength as object lessons for the future.

Scores of retrospective analyses of the war are current and in practically all of them certain conclusions stand out clearly. One is that defeat for the Allied nations was averted by the narrowest of margins on several occasions. Mere chance saved England from invasion at the time of Dunkerque. A union of Nazi and Japanese forces came too near to realization for comfort. Had Japan followed up on her initial advantage at Pearl Harbor, our difficulties would have been increased many fold. If Germany had gained a few more weeks of time in which to perfect her "secret" weapons, the result might have been different. In short, there were times when victory for our side hung in the balance.

A second noteworthy conclusion is that the skill, intelligence, courage and mechanical aptitude of the individual American serviceman was a big factor in victory. No other nation had such a high proportion of men in uniform who could act independently in an emergency and could operate things mechanical and electrical as effectively. The heritage of skills that comes from widespread use of mechanical and electrical equipment in normal American life paid great dividends in this war.

Third among outstanding conclusions is that in the final analysis it was our tremendous capacity to turn out superior equipment that turned the tide of battle in favor of the Allied nations. We know now that Germany had great ingenuity and abundant production facilities, plus a head start of nearly a decade. That we overtook her so quickly is a miracle. Japan's industrial capacity, in itself, never was a serious menace.

Examining these conclusions, we find, first, that the close margin by which we escaped disaster on several occasions emphasizes clearly our state of unpreparedness in the earlier stages of the war. Secondly, we find it was the sterling character of our fighting men and the superb support of our productive machinery which enabled us to retrieve the victory that we almost lost as a result of our unpreparedness.

How clearly this points to an object lesson for the future! Now, while peace is fresh, we should store critical materials, equipment, supplies and "know how" so that they will be on tap immediately when danger threatens.

REPRIEVE FOR STEEL: Sobered by the weight of its immediate responsibilities, the Attlee government has decided that all it can tackle in the field of nationalization in the coming year is the Bank of England and coal mining. This is quite a come-down from the Laborites' campaign program, which included nationalization of coal mining, transport, distribution of electricity, the iron and steel industry and the Bank of England.

Postponing action on transport, utilities and iron and steel may prove important. Nationalizing mining and the bank will be simpler than nationalizing the other three fields. But although simpler, they will be difficult. Unless the new system shows beneficial results in mining and banking at a fairly early date, public opinion will begin to question the wisdom of extending the system to other fields.

This is one source of hope for continuing British iron and steel on a free enterprise basis. Another is the fact iron and steel is not sick and inefficient, as is coal mining. Still another is that the industry already had announced an extensive postwar ex-

(OVER)

pansion and modernization program. Also, nationalizing iron and steel would involve endless complications.

While there is life there is hope. In the meantime it is unfortunate that British steelmakers have to operate under the uncertainties of the present situation. —p. 75

• • •

WLB IS ON WAY OUT: Some rays of hope appear in the manner in which President Truman is approaching the problem of labor policy. At present the War Labor Board is functioning on an interim basis, with full understanding that it will be liquidated as soon as the administration's postwar labor setup has been formulated.

This setup will be influenced considerably and perhaps fully determined by the forthcoming government-management-labor conference to be held about Oct. 15. Secretaries Schwellenbach and Wallace are drafting an agenda for the conference. Eric Johnston, Ira Mosher, Philip Murray and William Green probably will be asked to suggest names of conferees to represent their respective interests—management and labor.

If the conference comes up with a satisfactory postwar labor program, then the President can disband WLB and the Department of Labor can carry on as the government's sole labor agency. Should this come to pass, the Department of Labor for the first time in 12 years will be functioning on the job it was created to perform. —p. 84

• • •

ERASING WAR'S SCARS: Editorial Correspondent George R. Reiss, returning from a 20,000-mile tour of devastated Europe, paints an impressive picture of the ruin that Allied bombing inflicted upon the cities and industries of Germany. The cost of rebuilding Berlin alone is estimated at 10 billion marks. Hamburg is 85 per cent destroyed, Bremen 50 per cent and Cologne almost completely wrecked.

Rehabilitation will be slow, because great quantities of materials, equipment and supplies are being shipped to Russia and other United Nations countries to facilitate reconstruction there. One large metalworking company had 1500 machine tools in operating condition after bombing ceased. Of these 1400 were shipped to Russia.

The havoc of war in Russia, France, Italy, England, China, Japan and other countries is but a duplication of the German scene. Can all the world, working to the best advantage, repair the physical damage alone in a decade? —p. 88

POSTWAR POSTSCRIPTS: Unemployment is not an immediate postwar problem in the San Francisco bay region. Its big reconversion shakeout occurred last spring and early summer. Today the bay area has jobs available for 24,000 persons. In Los Angeles, where reconversion is somewhat more difficult (p. 82), for every three persons laid off, jobs are waiting for two. . . . Cancellations of steel orders on the books of Pittsburgh steelmakers since V-J Day, while substantial (p. 81), have been considerably less than expected. . . . WPB has issued a report showing the expansion of industry during the war years. The period 1940-1944 marked the greatest expansion of industry—manufacturing, mining and construction (p. 80)—of any five-year period in the history of the country. Industrial output more than doubled, whereas the most rapid peacetime expansion has never exceeded 12 per cent. . . . Machine tool builders are shipping at the rate of $32 million per month (p. 78) and have sufficient unfilled orders on hand to assure production at the present rate for seven months. . . . Electropolishing processes now are in use and available on a commercial scale in production. On some applications, it can compete with mechanical methods (p. 104), but it is not a cure-all and each installation must be custom-built. . . . Congress will be asked to authorize publication by the government (p. 87) of a standard commodity catalog to list everything that is on the market. . . . Ford and Hudson, first automobile builders to get their assembly lines moving are stymied by strikes (p. 91) and the prospect for labor harmony in motordom is anything but good. . . . Isaacson Iron Works in Seattle has obtained 178 heats from the roof of a 40-ton electric furnace. The method of laying up the roof lining (p. 124) and the precautions taken to avoid unnecessary temperature variations will be interesting to every electric furnace operator. . . . OPA has prepared a chart (p. 97) intended to show as simply as possible its ceiling price policy for reconverting manufacturers. It explains how various alternatives to existing ceiling prices can be determined. . . . Coal production is mounting again and in the week ending Aug. 25 (p. 198) was only slightly below output in the corresponding week of 1944. . . . Magnets, which require precision casting and finishing (p. 92), constitute 99 per cent of the weight of a completed atom-smashing cyclotron.

E. L. Shaner

EDITOR-IN-CHIEF

STEEL WITHOUT PRIORITY

IMMEDIATE SHIPMENT FROM RYERSON STOCKS

It may not be news to you—but government restrictions have been lifted on the sale of steel products by warehouses. You can now obtain steel from stock in every form without red tape—only rated priority orders take precedence. This is a welcome relief for all of us. A small part of the victory you and we have worked so hard to win.

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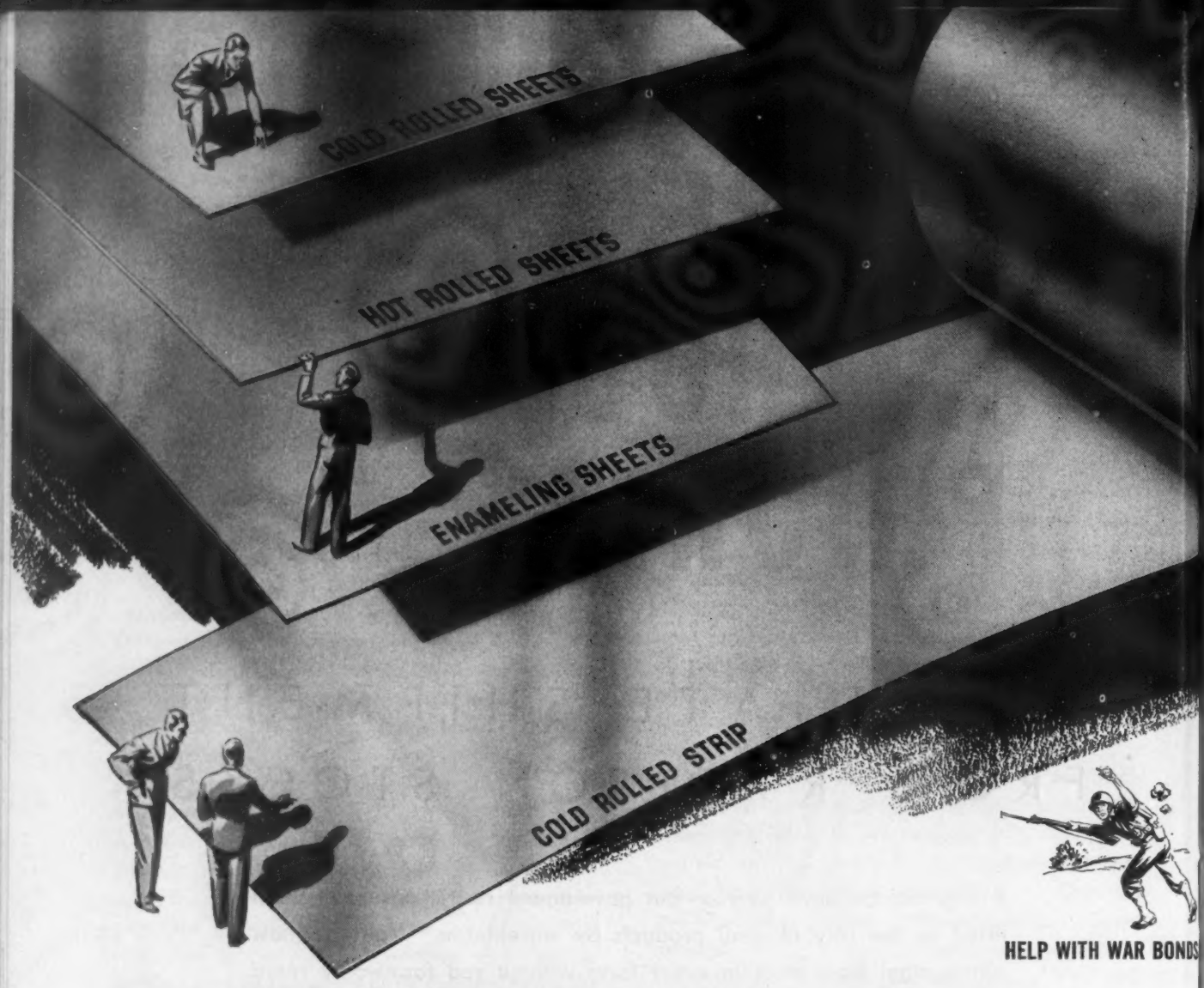

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Britain's coal mining industry long has been a scene of strife, which accounts in large measure for the coal industry being given the No. 1 position in the Labor party's program for nationalization of industry. Here British "bobbies" police a Welsh coal mine during a bitter strike.
NEA photo

British Steel Industry Not Slated For Early Nationalization

Coal mining and Bank of England are first on Labor government's program of socialism. Taking over of metal producing and metalworking industry scheduled for some future date, but plans are not yet well defined. Party to maintain strict controls

By VINCENT DELPORT
European Editor, STEEL

LONDON

IRON and steel is not scheduled for nationalization during the forthcoming session of the British Parliament, according to the declaration of policy made in the King's speech by the new Socialist premier at the opening of Parliament Aug. 15. This does not mean that the iron and steel industry has been altogether removed from the Labor party's program of nationalization, which they intend to carry out while they are in power.

According to custom, the King's speech embodies the program of legislation that the government intends to submit to Parliament during the session to come, and this covers the best part of a year, unless the government is overthrown, in which case another election would take place, and, presumably, a new party would come into power with a different program.

Obviously the new cabinet has found that all it could tackle in the field of nationalization in the course of the first year of parliamentary activities was the Bank of England and coal mining. Cabinet members found themselves already facing the immediate issues of demobilization, rehousing, transition to peacetime problems of reconstruction and necessary legislation to be passed to put into effect the new national insurance, health service and education programs already agreed upon under the late coalition government.

So the iron and steel industry is in the undesirable position of a patient waiting to be told when a major operation is to be performed upon him. Still, while there is life there is hope.

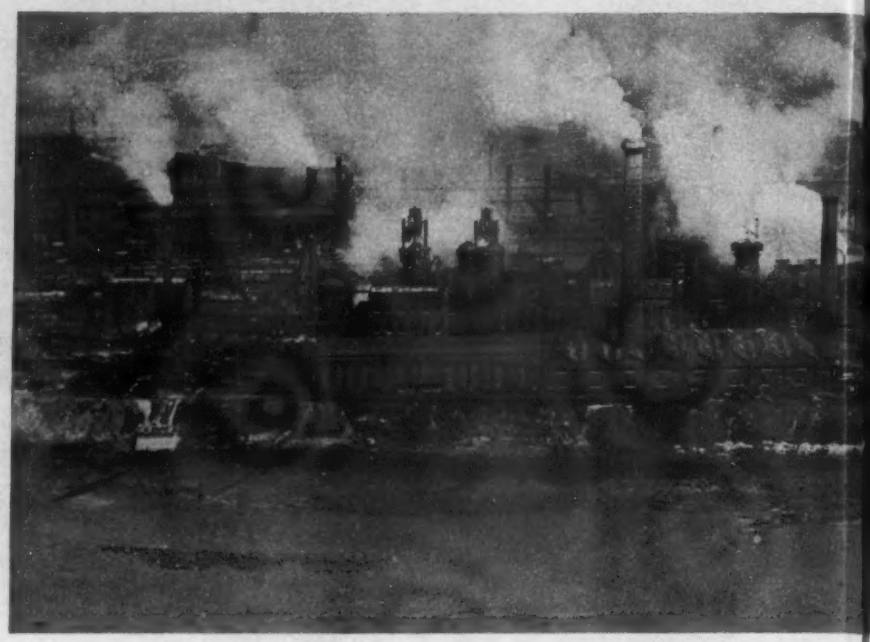
The astonishment that spread over the country when it became evident that the electorate had given a sweeping overall majority to a Socialist government was shared to the full by Labor itself; in fact, there is reason to believe that the

Socialist leaders were not overconfident about the result. However, the first reaction of surprise was quickly overshadowed by the terrifying and momentous announcement of the fall on Japan of the first atomic bomb, followed by the no less memorable notification of Russia's declaration of war against Japan. This succession of staggering events culminated in the announcement of the end of the World War, and the opening of the British Parliament with the pronouncement of the King's speech fittingly coincided with the first outbursts of peace celebration. The actual statement of the more immediate government program came almost as an anticlimax, as the intentions of the Labor party, if it came to power, were already known to the public through publication of the party's manifesto, "Let Us Face the Future."

It already has been stated that the victorious party intends to maintain a tight control of the economy of the nation, and that it is prepared to go to the extreme limit of nationalization in regard to coal mining, transport, distribution of electricity, the iron and steel industry, and the Bank of England. To what extent detailed plans had been prepared to realize these ambitions and revolutionary schemes is not known, but it is suspected that in certain fields planning has not gone very far, although there is little doubt that a pretty comprehensive "blue print" exists for coal mining.

Secures Financial Control

That the Bank of England should be the first organization to be taken in hand, concurrently with the coal mining industry, is hardly surprising. For one thing, it is a strategic move to get control of the purse strings; secondly, the Bank of England is an individual entity, which can be taken over by the state and placed on the altar of public ownership without the complications that surround diversified industries operated by numerous concerns of varying importance. Already the "Old Lady of Threadneedle Street" is almost completely controlled by the Treasury, and her removal from the secluded circle of private ownership to the public square will hardly affect the lives of individual members of the public. The thing that matters is, what will be the new government's banking policy in regard to insuring credit for industry and for combatting possible unemployment? The declaration of government policy also mentions provision to be made for "the effective planning of investment," and one may wonder to what extent investments in the form of new capital to nourish industry may be controlled and directed; whether on broad general lines or by inquisitive methods to be applied to individual issues of industrial concerns. These questions cannot be answered until the government experts disclose more accurately what is in their minds. It might be mentioned in passing, that the Attlee government is not altogether breaking new ground, since other nations already have a state bank, and a move in that direction had been made in France shortly before the outbreak of the war.



Air view of British blast furnace plant at Barrow. The British iron and steel industry has plans for a large-scale expansion and modernization program which calls for the expenditure of about $500 million

Nationalization of an industry such as coal mining is quite a different matter. In this field the new government had to take position without any delay, because the coal mining industry is very sick, and there is a widespread impression that a fair proportion of miners are unlikely to increase their efforts unless they are given the incentive of knowing that coal extraction is no longer a source of private profit. The demand for nationalization of coal mining is of long standing, and was already insistent before the war, although in a more subdued tone than at present. Already the mines themselves have passed into public ownership, the original royalty holders having been compensated to the extent of £70 million.

Plans Originated Years Ago

Plans for the operation of mines under complete state control were elaborated many years ago. More recently a committee of members of the Miners' union and of the Labor party has been sitting to go into more detail and, no doubt, to perfect the plans in the light of recent experience. The new minister of fuel and power, Emanuel Shinwell, was chairman of this committee, until he took office in the cabinet.

A bill probably will be placed before Parliament soon to put the new plans into effect, and, with its majority of almost 150, the new government is bound to get its bill through, despite the strong opposition that is likely to arise from the Conservative benches.

Retrospectively, it is interesting to note that in January, 1945, a plan of reorganization of the coal industry under private enterprise was published by Robert Foot, chairman of the Mining Association of Great Britain. This plan was acceptable to the association, but was rejected by the miners' leaders. Later in the year, a White Paper was issued by Maj. Lloyd George, minister of fuel and power in the coalition and caretaker governments, which also embodied a plan of reorganization, but while preserving the principle of private enterprise, this provided for a certain measure of control; this plan would have been acceptable to the industry, but did not go far enough to please the miners' leaders and the Labor party. Whatever may be the present government's plan, it must face the essential necessity of providing fuel and power to industry in sufficient quantity and at an economic price, while at the same time providing for the ordinary public's needs. That will be the crucial test.

Will the iron and steel industry be nationalized? It is earmarked for such treatment at some future date, but the answer to the question is not simple. Coal mining, in comparison with iron and steel, is a well defined industry, and one can visualize such an industry as being subjected to a process of centralization. But what of iron and steel? Will nationalization be circumscribed to pig iron and steel ingots? Will it be extended to semifinished products? Or will it include structural steel, rails, merchant steel, sheets, etc.? If the latter, where is it going to stop? It is doubtful whether those who proposed the schemes have made up their own minds.

How will nationalization affect a concern, and there are many such, that owns iron ore deposits, operates blast furnaces and steel furnaces, rolls its own steel and

manufactures such finished products as tin plate, nuts and bolts, and even umbrella frames? If merchant steel comes within the scope of nationalization, what will happen to the small rerolling firms?

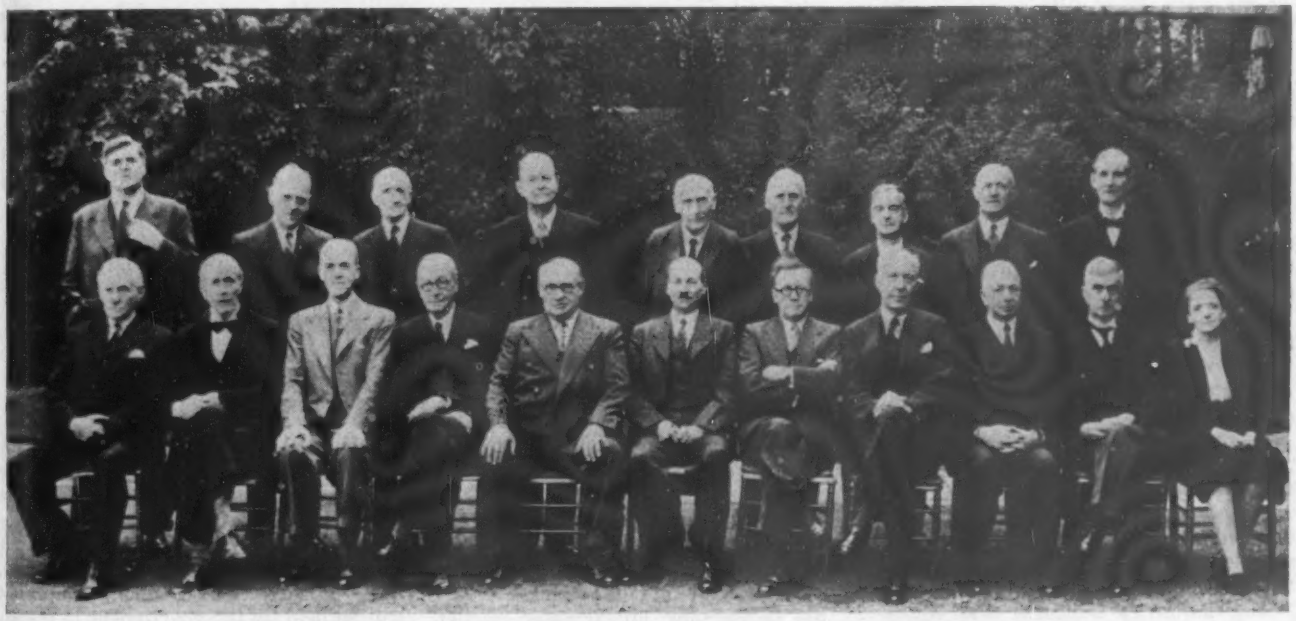
The question is particularly complicated in regard to castings. Some large concerns have their own blast furnaces, and use their pig iron to manufacture cast iron pipe on a large scale, all in one group of works, but taking the iron foundry industry as a whole, there are some 1800 foundries in Great Britain, comprising large integrated groups, down to small privately owned foundries employing no more than a dozen men. There is the case of the jobbing foundry that plays an essential part in handling repairs for local undertakings, shipyards, etc. And let it be said here that there are some small foundries that do work very efficiently. The complication of the iron foundry industry already came to light when an attempt was made during the war to concentrate the industry, and it was found impracticable to do so.

Is there any reason to nationalize the iron and steel industry on account of alleged general inefficiency? This does not appear to be the case. During the war, in the face of the greatest difficulties, such as labor shortage, bombing, difficulties of transport, shortage of raw materials, the industry reached a peak production of 13 million tons of steel ingots and castings, as against an average annual output of 11,256,000 tons in the years 1935-38. Before the war the industry had reached a high degree of organization, and the process of integration, modernizing, adoption of new and more economic processes has been continuing throughout the war years, and would have proceeded at an accelerated rate had it not been for the war. Only recently, as reported in these columns, the British Iron & Steel Federation announced a plan of reconstruction to be spread over the next five years, that would call for an expenditure of £120 million. These plans were prepared by the industry in the confident expectation that the money would be found, and that the industry itself, by "running its own show" would achieve its object.

It has also been stated that a new research organization, the British Iron & Steel Research Association, had been set up, which will have the benefit of utilizing research laboratories associated with the industry and the universities, and will be able to call upon the services of the leading scientists and technical people. The industry is prepared to set aside a sum of £200,000 per annum, which, together with a grant from the Department of Scientific and Industrial Research and other sources of revenue, will mean a total of £400,000 per annum placed at the disposal of the research association; this in addition to the large sums already spent by industry on research and development in its own laboratories and works.

Would nationalization do better for the iron and steel industry and achieve the end more efficiently than the industry is doing itself through its own resources? The answer may be found in a recent manifesto issued by the Iron & Steel Trades Confederation, in which it was stated that the expenditure involved for capital equipment necessary to modernize and expand the industry could not be left to private enterprise. It also asserted that

(*Please turn to Page* 217)



Photographed on the lawn at No. 10 Downing Street, London, are the members of Britain's Labor cabinet. Front row, left to right: Viscount Addison, secretary of state for dominions; Lord Jowitt, lord chancellor; Sir Stafford Cripps, president of the Board of Trade; Arthur Greenwood, lord privy seal; Ernest Bevin, foreign minister; C. R. Attlee, prime minister; Herbert Morrison, lord president of the council; Hugh Dalton, chancellor of the exchequer; A. V. Alexander, first lord of the admiralty; J. Chuter Ede, secretary of state for the home department; Ellen Wilkinson, minister of education. Back row: Aneurin Bevan, minister of health; G. A. Isaacs, minister of labor and national service; Viscount Stansgate, secretary of state for air; G. H. Hall, secretary of state for colonies; Pethick Lawrence, secretary of state for India and Burma; J. J. Lawson, secretary of war; J. Westwood, secretary of state for Scotland; Emanuel Shinwell, minister of fuel and power; and Tom Williams, minister of agriculture and fisheries. NEA photo

Changeover Progress Is Rapid

Civilian industries meeting challenge of transition. Dollar value of production by year's end to exceed that of prewar years

RECONVERSION is progressing faster than anticipated and civilian production in key industries promises to exceed the 1939-41 base rate by the end of the year.

Highly encouraging reports on the progress of reconversion are being received from many industrial centers by the Committee for Economic Development. These reports indicate industry is reconverting its plants from war to peace production much more quickly and easily and that reconversion unemployment is smaller than anticipated.

A survey by the War Production Board of 62 peacetime industries indicates that output of goods by the end of the year will be slightly above the level of the three prewar years, that employment will be only slightly below the base period and that by the middle of 1946 both production and employment will be higher than in the prewar years.

"This survey on production and employment expectations for the next ten months shows that the industries reporting are going ahead with ambitious production and expansion plans and that they are meeting no greater difficulties than were to be expected during this transition period, and they already are surmounting such difficulties with typical American ingenuity," according to WPB Chairman J. A. Krug.

Accepting either 1939, 1940, or 1941 as a normal year, depending on the industry, the following are industries' estimates of production in terms of dollars and employment:

1. In July, 1945, production was at 46 per cent and employment at 51 per cent.
2. It was estimated that production in August would be up to 48 per cent with employment rising to 57 per cent.
3. By December of this year, their production will be 112 per cent and their employment 96 per cent.
4. And that by June of 1946, their production may skyrocket to 187 per cent with employment up to 133 per cent of the base period.

The industries indicated one reason for the optimistic forecasts is the rapid relaxation of WPB controls following closely on the huge military cutbacks and the speed with which these cutbacks are beginning to be reflected at mill level.

Moreover, many of the shortages of tools or components which loomed up in August are expected to be eased or eliminated in the last quarter of this year.

In addition, manufacturing construction is expected to be in full swing soon, adding further impetus to production and employment.

To train war workers now employed for the production of civilian goods, Casco Products Corp., Bridgeport, Conn., has set up a "reconversion school." Here employees attend a demonstration on the assembly of electric heating pads, one of the company's peacetime products. NEA photo

Indicative of the expectations of civilian industries are those of 11 automobile builders. Average monthly output during the base period was 313,678. During July, output was 359. For December, production is estimated at 223,656 and for June, 1946, at 504,452.

Twenty-eight domestic laundry equipment manufacturers, which had an average monthly production valued at $7,489,000 during the base period, expect output valued at $12,574,000 in December, and $22,044,000 by next June.

Sixteen vacuum cleaner makers reported average monthly output of $4,270,000 during the base period, expected $7,875,000 in December, and $9,100,000 in June, 1946.

Machine Tool Backlogs Adequate For Seven Months' Production

MACHINE tool builders are shipping at the rate of $32 million per month, and, according to a spokesman for the National Machine Tool Builders Association, the industry has sufficient unfilled orders on books to assure seven months' production at the current rate.

Shipments now are reported higher than the 1939 average and just under the 1940 mark when heavy sales were being made to England. Among orders on builders' books are many from France, Belgium and China. However, American demand is getting first attention.

The American machine tool industry expects sale of government-owned machinery eventually may deal it a severe blow. Up to the present, however, this government machinery has come onto the market only in driblets so that it has not been particularly disturbing. Actually the impact of this surplus machinery on the market may be less severe than generally expected. For one thing a large part of it has no peacetime application. Then, also, there is the fact that much equipment will be held by the government in stand-by condition for a future emergency. On top of this, much of the government-owned machinery has seen such hard use it will be difficult to market. Special purpose tools will not be readily adaptable to peacetime production.

Tool builders plan to push export trade aggressively. Several noncompeting companies are understood to have banded together to set up offices in South America, planning to offer a wide range

of American machine tools. Before the war American tool sales in South America represented only a small fraction of the industry's export volume.

As a general thing the machine tool industry was in good shape to go ahead on peacetime production when the war with Japan ended. Since last April war tool business had been shrinking and many builders had turned to subcontracting on a broad scale to keep their plants occupied. For several months past the industry has been permitted to book unrated orders. Starting Sept. 30, all tools will be listed as unrated and available to the open market.

Smaller War Plants Corp. is sending out a questionnaire to all small metalworking plants registered with it—some 35,000—asking them to report on their machine tool needs. This is the first survey of this type undertaken by the SWPC in conformity with instructions in the Surplus Property Act. In the letter to these 35,000 companies, Maury Maverick, SWPC chairman and general manager, offers to find needed machine tools in government surplus stocks and also to loan money when needed to expedite purchase of the tools. One of the purposes of the inquiry, Mr. Maverick says, is to ascertain the size of the overall small plant machine tool requirements.

In urging small plant managements to specify their needs, Mr. Maverick states in his letter that the average machine tool in small plants is 15 years old, and many tools in these plants are over 30 years old. If small plants hope to survive in the postwar era, the letter says, they must be modernized.

New Steel Wage Demands Will Be Made This Week

Drive for higher steel wages, to offset the loss of overtime pay due to the shorter work-week, will be opened officially this week when the wage policy committee of the United Steelworkers of America convenes in Pittsburgh, Sept. 11.

While details of the steelworkers' demands have not yet been revealed, and possibly not formulated, recent statements of union officials indicate the union will start with a demand for a 30 per cent increase in hourly rates. This would give workers the same take-home pay for 40 hours' work that they have been receiving for 48 hours.

Such increases already have been asked by the United Automobile Workers and other CIO unionists.

In announcing the policy committee meeting, President Philip Murray said the union will ask the companies to engage in collective bargaining and declared flatly that it was the union's intention to kick the Little Steel wage formula "out the window."

The last meeting of the steelworkers' wage policy committee was held in December, 1943, and out of it came demands for a 17-cent hourly increase and other demands, which after extended hearings before the War Labor Board resulted in an 8-cent increase through fringe issues.

This and other increases have so raised steelmaking costs that industry earnings have decreased steadily during the war, despite capacity operations and despite high demand for premium-priced war products. Actual losses have been incurred on many carbon products which will form the bulk of peacetime demand and the industry now has pending before the Office of Price Administration a request for adjustment of prices.

Truck Producers Must Still File Production Reports

Although restrictions on quantities and types of trucks and truck trailers have been removed, producers are still required to report on production and forecast of production. Production of both military and commercial trucks will continue to be reported on form WPB-4291 or some other form designated by the War Production Board.

Use of Lead in Batteries Cut Further by WPB

Many prewar users of lead will not be able to obtain a sufficient supply of that metal in the immediate future, despite the end of the war, War Production Board said recently. Order M-38, which restricts delivery and controls the use of lead and lead products, has been amended to limit the antimonial lead that may be used for storage batteries to 9 per cent antimony content, except where specified for contracts for the Army, Navy, Maritime Commission, or the War Shipping Administration in which an alloy with a higher antimony content is mandatory.

Present, Past and Pending

■ PONTIAC BEGINS RECORD EXPANSION PROGRAM

DETROIT—Pontiac Motor Division, General Motors Corp., has begun an expansion program which will enable it to produce 500,000 automobiles a year. Expansion of the foundry alone will cost $3,081,365, following a $1 million program four years ago. Engine, axle, assembly and sheet metal plants and heat-treating and car shipping departments will be enlarged.

■ $10 BILLION WAR PRODUCTION SCHEDULED TO MID-1946

WASHINGTON—War production still scheduled to the middle of 1946 totals about $10 billion, or about one-third of the total in force as of Aug. 1, WPB reported last week. Total contracts will not fall below $2 billion until the first quarter of next year. September production is scheduled at $1.6 billion. 1945 production is now estimated at about $39,200 million.

■ FORD'S BUFFALO PLANT PLANS RECORD OPERATIONS

BUFFALO—Ford Motor Co.'s plant here will reach a new output peak of more than 450 vehicles a day and a new employment peak of 2200 workers before the year end, Robert F. Leonard, plant manager, said last week.

■ ATOMIC POWER EVENTUALLY MAY DRIVE GAS TURBINES

NEW YORK—Application of atomic power to drive gas turbines is visualized by many members of ASME committee as one of first industrial uses. New source of energy will supplement present fuels.

■ BURLINGTON ORDERS TWO ZEPHYRS, TEN LOCOMOTIVES

CHICAGO—Chicago, Burlington & Quincy railroad has ordered more than $6,500,000 worth of new passenger car equipment, including two Zephyrs to be built by the Edward G. Budd Mfg. Co. The railroad has ordered ten new 4000-horsepower diesel locomotives from Electro-Motive Division, General Motors Corp.

■ STEEL MILL SOFT COAL ESTIMATED NEEDS REDUCED

WASHINGTON—Estimated soft coal needs of steel mills for coke ovens during year ending March 31, 1946, have been lowered to: Beehive, 5,700,000 tons; by-product, 86,500,000; rolling mills, 10,000,000; coal gas retorts, 1,500,000. Total industrial needs of 585 million tons may not be produced due to manpower shortage.

■ REYNOLDS METALS TO BUILD $1 MILLION LABORATORY

RICHMOND, VA.—Reynolds Metals Co. plans to construct a $1 million research laboratory at Cambridge, Mass., according to R. S. Reynolds Sr., president.

■ HIGH-ALLOY CASTING PRICE SCHEDULE REVISED

WASHINGTON—Office of Price Administration has established foundries' ceiling prices on sales of "short orders" of high-alloy castings.

Tremendous Industrial Expansion During War Shown in WPB Report

Years 1940-1944 witnessed greatest expansion of industry in any five-year period in history. Output more than doubled. Growth in metalworking gives it greater proportionate share of total employment and national production

ACHIEVEMENT by the United States of a volume of war production that astounded the world, while at the same time total civilian production was maintained at prewar levels, is pictured in a report released last week by the War Production Board.

The report covers in detail United States production from 1939 through 1944, with tables and charts.

The years 1940 through 1944 marked the greatest expansion of industry—manufacturing, mining and construction—of any five-year period in the history of the country. Industrial output more than doubled. This compares with a long-term average growth of about 4 per cent a year, with a 7 per cent annual increase during the last war, and with an 8 to 12 per cent rate during the years of most rapid peacetime expansion.

The report attributed this expansion to three factors: (1) Increased utilization of available production resources (two and three-shift factory operations, longer hours for labor, etc.); (2) the diversion of resources from other sections of the economy to industry; and (3) an increase in productivity of the resources used in industry (more production per man-hour, per machine-hour, per ton of raw materials).

From 1940 to 1944, over $25 billion was invested in new plants and equipment, increasing the country's industrial capacity by at least 40 per cent. In addition, utilization of industrial facilities, as measured by machine-hours per week, rose well over one-third above prewar levels.

Raw Materials Production Rose

The production of industrial raw materials increased more than 60 per cent during the war. For example, 1944 production of steel ingots was more than 70 per cent greater than in 1939 and nearly 50 per cent above the previous peak year of 1929, while the output of light metals and certain chemicals soared to many times their prewar levels.

Between 1939 and 1944, the total number of persons available for either civilian employment or military service increased nearly 20 per cent. Industrial employment rose at more than twice that rate in the aggregate, and the employment rise in the munitions (metal and chemical) industries was no less than 150 per cent. This expansion in industrial employment, plus an increase of about 20 per cent in the work week, meant that total man-hours worked in industry in 1944 were about 75 per cent greater than in 1939.

Wartime expansion of output led to a very pronounced improvement in the financial position of American industry, the report continues. Profits before taxes rose about 350 per cent, and profits after taxes, 120 per cent, far exceeding the 1929 level. Net worth increased about one-third. Net working capital doubled. Smaller firms have, on the whole, bettered their financial position about as much as the larger businesses, the report said.

The expansion of the last five years was much greater for some segments of the economy than for others. Particularly significant was the growth of the industrial sector, which accounted for 38 per cent of the national income in 1944, compared with 29 per cent in 1939. Within industry itself, the outstanding shift was from civilian-type commodities to munitions. Late in 1944 about one-third of the total output of manufacturing industries consisted of combat munitions and other special military items as against only about one per cent in 1939. In addition the armed services received large quantities of civilian-type industrial commodities. Expansion of total industrial output, however, was so large that in the aggregate the civilian market was about as amply supplied in 1944 as in 1939, although somewhat less well than in 1941.

While almost all industries expanded to some degree—virtually the only exceptions were printing and publishing, apparel and shoes—the sharpest rise occurred in aircraft, shipbuilding, explosives and light metals, in which production multiplied from 20 to 35 times between 1940 and 1944. As a result, these industries came to employ over 20 per cent of the total industrial labor force in the latter part of 1944, compared with an almost negligible proportion in 1939.

Regional shifts, the report points out, were much less marked. Although the Pacific Coast states made the most striking advances, the center of United States

HEALTH IN INDUSTRY: A new program to explore industrial hazards and control tuberculosis is sponsored by New York City Department of Health and New York State Department of Labor, utilizing equipment provided by U. S. Public Health Service. Production line techniques are being applied here with a mass-chest-radiography unit developed by North American Philips Co. Inc., Dobbs Ferry, N. Y., to handle large numbers of plant workers rapidly

manufacturing has remained where it was before the war, in the northeastern and north central states. Shifts among cities have been somewhat more pronounced, although only a relatively few of them—mostly shipbuilding and aircraft centers—have expanded much more than the national average.

The report notes that only certain aspects of the wartime expansion of industry seem in line with the trends observed in the 30 to 50 years before the war. The higher productivity, the shift of industry toward the West and Southwest, the rising proportion of women in the labor force, and the increase in the share of large plants in total employment continue prewar trends. But many of the shifts that have accompanied the wartime expansion of industry do not seem to be in keeping with long-term tendencies: For example, the increasing share of industry in providing employment and in contributing to the national income, extension of the work week, and the rising proportion of the population at work.

The most important of the shifts running contrary to long-term trends is the extraordinary expansion of the metalworking industries, giving them a greater share of total employment and national product than ever before. Hence, the report suggests either the rest of the civilian economy or exports, or both, would have to expand after the war to permit the present facilities and labor force of the metal industries to be fully utilized.

Steel Order Cancellations Less Than Expected at Pittsburgh

STEEL order cancellations have been substantial since V-J Day, but they have not been in the volume anticipated. As a matter of fact a surprisingly large tonnage has been retained on mill books, consumers seeking to hold their positions on rolling schedules wherever tonnage on order can be utilized in the production of civilian goods.

The bulk of cancellations at Pittsburgh has been in far forward delivery tonnage. This has enabled producers to get their schedules in order to accommodate the flood of civilian business which has been pouring in on them. So heavy has been demand in certain items, such as sheets and strip, that some producers are understood to have set up a sort of quota system so as to assure equitable distribution of available tonnage.

Last week the War Production Board announced that manufacturers need not return allotment tickets for controlled materials when they are no longer needed. It pointed out that as the result of freeing steel, copper and aluminum through cancellations and the imminent expiration of the Controlled Materials Plan, scheduled for Sept. 30, the allotment routine was no longer necessary. WPB effected the action by issuing Direction 77 to CMP regulation 1. The provisions of the direction supersede contrary provisions of CMP regulation 1, concerning the return of unneeded allotments.

The main problem in war contract settlement at present is to make sure contractors with terminations file their claims promptly.

To facilitate settlement of war contract claims, contracting agencies have been directed to provide direct settlement on a company-wide basis. Under this program a contractor has all of his termination claims settled by a single settlement team of a single contracting agency. Claims under both prime and subcontracts and against all agencies and their contractors are covered. Company-wide settlement will be extended only to a limited number of contractors.

Army Service Forces are stockpiling triple alloy scrap, containing over 1 per cent alloying material, that cannot be sold at near ceiling price levels, at Ravenna, O., and a number of other centers throughout the country, to conserve the nickel, chromium and molybdenum for possible future use.

Steel Industry's First-Half Earnings Show First Rise since 1941

FOR the first time since 1941, the steel industry's net earnings increased in the first six months of 1945 over those of the corresponding period of the previous year.

Combined net earnings of 16 companies, representing 84 per cent of the industry's ingot capacity, for the first half of 1945 totaled $87,316,316, a 12 per cent increase over the $78,149,175 earned by the same producers in the like period of the previous year.

The increase results largely from reduction in the amount of funds set aside for federal taxes and from a decline in expenditures for interest on debt.

Of the 16 companies, 14 set aside $158,644,893 for federal taxes for the first half of 1945, compared with $172,039,042 in the corresponding period of 1944. This represents an 8 per cent decline and marks the third consecutive year that provision for federal taxes by the industry for the first half year has been lower than that in the corresponding period of the previous year.

Combined net earnings in second quarter of 1945 for the 16 companies amounted to $45,377,042, exceeding those of the second quarter of 1944 by $6,371,713 or 16 per cent and surpassing those of the first quarter of 1945 by $3,437,768 or 8 per cent.

	Net Profits					Federal Taxes	
	First Quarter 1945	Second Quarter 1945	Second Quarter 1944	First Half 1945	First Half 1944	First Half 1945	First Half 1944
United States Steel Corp.	$15,379,171	$16,774,202	$15,354,917	$32,153,373	$32,382,533	$30,500,000	$49,000,000
Bethlehem Steel Corp.	7,695,909	8,041,682	6,733,843	15,737,591	13,166,381	42,550,000	49,800,000
Republic Steel Corp.	3,084,548	3,271,703	2,058,654	6,356,251	4,275,265	21,725,000	16,950,000
Jones & Laughlin Steel Corp.	2,013,489	2,357,524	1,879,835	4,371,013	3,588,187	6,948,000	5,178,000
Youngstown Sheet & Tube Co.	1,959,412	2,190,260	1,798,017	4,149,672	3,434,386	8,680,000	8,423,000
National Steel Corp.	3,429,088	3,453,183	2,863,315	6,883,171	5,413,458	17,725,000	9,725,000
Inland Steel Co.	2,472,734	2,943,490	2,659,022	5,416,224	5,171,418	8,706,000	9,546,000
American Rolling Mill Co.	1,875,503	2,071,925	1,212,456	3,947,428	2,441,491	7,424,110	4,390,542
Wheeling Steel Corp.	1,201,881	1,131,710	1,068,671	2,333,591	2,061,616	3,096,000	2,524,000
Crucible Steel Co. of America	803,558	397,721	1,482,517	1,201,279	2,761,819	6,185,783	12,155,000
Sharon Steel Corp.	301,760	364,793	141,233	666,553	307,745	1,740,000	1,070,000
Alan Wood Steel Co.	8,893*	74,958	126,404	66,065	204,233	38,000	289,000
Allegheny Ludlum Steel Corp.	936,690	1,027,097	800,110	1,963,787	1,665,175	.....	5,841,000
Continental Steel Corp.	151,892	208,672	167,574	360,564	323,380	315,000	228,500
Rustless Iron & Steel Corp.	448,914	638,381	470,921	1,087,295	1,024,989	3,012,000	2,760,000
Pittsburgh Steel Co.	192,718	429,741	187,840	622,459	72,901*	.....	.....
Totals	$41,939,274	$45,377,042	$39,005,329	$87,316,316	$78,149,175	$158,644,893	$177,880,042

*Loss.

Numerous Job Openings Reported In the San Francisco District

Unemployment is not an immediate postwar problem in area for several reasons. Region had its big reconversion shakeout months before the war ended. More positions now available than there are workers to fill them

SAN FRANCISCO

UNLIKE many another war-boomed center, unemployment in the San Francisco area is not an immediate postwar problem. There are several reasons.

Most important is the fact that this region had its big reconversion shakeout months before other parts of the country. Last spring and in early summer shipyards began nearing the end of their contracts and started laying off men in large numbers. Most of these discharged workers were absorbed quickly in other industries, and approximately a fourth left the area to return to their prewar homes in other sections of the country.

As a result, when the end of the war came, San Francisco had already passed the worst of its dislocation.

Secondly, there is the fact this area still is chief port of embarkation for occupation and replacement forces being sent to the Pacific and the supplies necessary to support them while they remain there. It also is the homecoming port for thousands of soldiers and sailors who will be coming home during the next year or two.

Third, San Francisco is the chief ship repair base on the West Coast, an activity which is expected to continue at a high rate for months to come.

Meanwhile, industries which had been pressing for workers during the war years are absorbing laid-off workers. Even so, more jobs remain available than there are people willing to work at them.

24,000 Workers Needed

It is estimated that the immediate need for labor totals 24,000 persons in the San Francisco Bay area.

A large part of this total is in service industries. However, essential operations also still need men. For example, 3000 to 4000 railroad workers could be placed immediately. Skilled mechanics are needed badly and building trades are facing an acute shortage of laborers.

Needs of civilian industries are expected to increase steadily during the next year and it is likely that 50,000 more workers will be required in addition to the 24,000 people immediately needed.

Two well-defined trends have become apparent in re-employment thus far. Employers are becoming more selective in the choice of workers. Workers themselves, after the first war's end rush to get settled in new jobs, are tending to be a little more choosey too.

Generally there hasn't been too much argument over wages. Most individual workers have shown a tendency to accept lower peacetime scales. However, union leaders have been taking a firmer stand in demands for pay raises to keep take home wages at wartime levels now that the 40-hour week is replacing the previous 48 hours.

There is considerable discussion of CIO proposals that workers fight for a 40-hour week with 48-hour pay. Nothing definite in the way of demands on this score has been made up to now however.

Shipyard unions have started a campaign for a 30 per cent increase in wages, which would figure out to an average raise of about $20 a week in pay. It is said such an increase would just about offset the loss of 8 hours a week in the time readjustment.

Building trades also are negotiating for wage increases which average out to about 15 per cent.

Expect Rapid Reconversion In Pacific Northwest Area

SEATTLE

War plants in this area are reducing working forces and terminating subcontracts, and as soon as adjustments are completed, it is expected reconversion will be rapid.

The Army has canceled 186 construction jobs and purchase orders totaling about $2 million, including a flight test hangar at Boeing Field estimated to cost $1,283,000. The Navy's cancellations have been equally heavy and include shipyard, machine shop, fabricating, airplane and other plants.

The effect of the surrender of Japan has been cushioned by the large number of war workers who have voluntarily terminated here and left for their homes in the East and South. In the first week after V-J Day, there were 9700 terminations at Seattle, 6750 at Vancouver, Wash., 6500 at Tacoma, 1400 at the Navy Yard, 650 at Everett, 400 at Spokane, 200 at Chehalis, 100 each at Mt. Vernon and Aberdeen.

Many Idle Workers Ignore Job Openings in Southern California Because of Lower Pay

LOS ANGELES

IN A breakdown by communities of employment terminations in southern California, the Los Angeles office of the War Manpower Commission last week concluded that for every three persons discharged, jobs for two await the taking.

A total of 83,000 layoffs have been reported since the Japanese surrender. Last week 15,000 workers were placed in new jobs and job openings remain at 50,000, according to Raymond Krah, acting WMC director in southern California.

In addition, 10,000 have been laid off in San Diego.

Many jobs still remain unfilled because former war workers in many cases refuse to accept wages less than those paid by munitions plants.

Checks at border stations show that war workers are still departing from southern California in large numbers, headed for midwestern and eastern states.

According to official estimates, about 75 per cent of the migrants will return to the West Coast after visiting relatives and home town areas in their native states. This is based upon questions asked typical travelers at various border points.

Complete listing of war plants in the Los Angeles area regarded as available for possible sale are being compiled by the Chamber of Commerce. James F. Bone, manager of the chamber's industrial department, said last week that engineers of his staff will leave shortly on trips to the Midwest and East to present findings in person before interested groups.

The study includes sources of raw materials and markets for finished products. It covers eleven western states and many foreign countries within easy shipping distance of Los Angeles county harbors.

About 6 per cent of the national wartime production of ships was centered in Los Angeles, although the city had but 4 per cent of the national wartime expansion.

This comparison keynoted a talk by Louis M. Dreves, southern California head of the WPB, before the Los Angeles Rotary Club last week. Mr. Dreves declared Los Angeles now is ready for an industrial growth as large as, for instance, that registered in Cleveland or Toledo.

Steel Institute Technical Papers Discuss New Production Problems

Increased use of pig iron in open hearths to offset lack of scrap, progress report on hardenability bands, Witter process for shell forgings, and manufacture of fine steel wire are among subjects in 1945 yearbook

WARTIME need for using more pig iron in making open-hearth steel to offset the reduced supply of scrap imposed new problems of raw materials selection, according to Clyde Denlinger, Bethlehem Steel Co., in a paper prepared for the 1945 Yearbook of the American Iron & Steel Institute, New York.

Other papers to appear in the Yearbook are "Progress Report on Hardenability Bands," by John Mitchell, metallurgical engineer, Carnegie-Illinois Steel Corp., Pittsburgh; "The Witter Process for Shell Forgings and the Spinning Process for Bombs," by J. L. Johnson, chief research engineer, National Tube Co., Christy Park Works; and, "Manufacture of Fine Steel Wire and Some of Its War Applications," by J. R. Thompson, manager, metallurgical department, American Steel & Wire Co.

Mr. Denlinger points out that the selection of the iron ores used in the open-hearth furnace to counteract the additional amount of carbon present in pig iron, as compared with the amount of carbon present in the conventional scrap-pig mix, has presented several problems. One concerns the grade of the ore, such as soft (fine), hard (lump), briquetted and other grades. Another relates to the analysis. Some ores contain more moisture than others; some are relatively high in unwanted compounds such as silica. A third type covers the preliminary treatment of some ores to get them into suitable condition for use in the furnace. A few ores can be mixed with blast furnace flue dust and then heated to yield a satisfactory porous sinter. Others can be mixed with roll scale, an iron oxide that forms at high temperature on rolled steel.

John Mitchell announced that consumers and producers of alloy steels, pooling their wartime experience, have completed the first phase of a joint investigation of an improved method of specifying and testing various types of alloy steels.

The purpose of the investigation is to enable consumers to describe more completely what conditions of hardness they need in finished alloy steel products so that steelmakers can supply exactly what is wanted to a greater precision than formerly. The study is being conducted by representatives of the Society of Automotive Engineers and the American Iron & Steel Institute Technical Committee on Alloy Steel.

The joint study is developing a method of specifying how hard the steel should be, at the center of various sized rounds, after specimens of the steel are heated and quenched according to a detailed procedure. This method approximates actual conditions of use, for a large part of the alloy steel used is hardened or otherwise heat treated by the consumer.

Output of shells and bombs was trebled in steel plants and important savings in manpower and steel were effected as a result of the introduction of the Witter process for making shells and the spinning process for bombs, according to Mr. Johnson.

In making a 3-in. shell the Witter process starts with a heated steel slug shaped like a thick tube closed at one end. Three rolls "cross-roll" or knead the heated metal to reduce the wall thickness and lengthen the slug. The resulting "cup" is pushed through a sizing die to give it the desired dimensions before it is machined to the finished dimensions.

The spinning process for making 100 and 200-lb aerial bombs from steel tubes gets its name from the way it spins or forms the nose and tail sections of the bombs. One end of a seamless tube is placed in a furnace until it is hot enough for forgings. The tube is then placed in a machine which spins it at a high rate of speed. A shaping wheel or tool, rotated by frictional contact with the spinning tube, forms the desired contours.

Communication systems that kept personnel and supplies on the move along Pacific battle fronts required tremendous amounts of fine steel wire, reports Mr. Thompson. About 1,300,000 miles of one size of wire, almost as thin as a playing card, are required for a month's production of the Signal Corps' 7-wire strand used in communications.

Steel wire 0.013-in. in diameter is used for the communication strand. As four of these wires are twisted around three copper wires to make the strand, the wires must be tough enough to twist satisfactorily. Each individual wire must be able to support a load of 37 pounds, equivalent to a strength of about 140 tons per sq in. of wire cross section.

TRANSITION TOPICS

BRITISH SOCIALISM— Labor party's program calls for eventual nationalization of iron and steel industry, but plans are indefinite, may never mature. Coal mining and Bank of England are first on party's agenda. See page 75.

MACHINE TOOLS— Sales of government-owned surplus items not yet affecting new tool sales. Builders' backlogs sufficient for seven months' operations at present rate. See page 78.

WAGES— New steel wage demands to be formulated by union this week. Steelworkers will seek to maintain wartime take-home pay with shorter work-week. See page 79.

WAR LABOR BOARD— Agency for settling wartime disputes and controlling wages prepares to disband, but some policies established during emergency will linger on. See page 84.

DEVASTATED EUROPE— Huge reconstruction task necessary on war-torn Continent. Cost of rebuilding Berlin alone estimated at 10 billion marks. See page 88.

AIRCRAFT— Planemakers designing in terms of function. New development will make great commercial air fleets possible. Present military craft will be made obsolete quickly. See page 98.

ELECTROPOLISHING— Summary of current status of electrolytic polishing process shows why some producers of consumer articles may use it for new finishing effects and possible economies. See page 104.

"CANNED" GUNS— Open-field storage of ordnance items, with full protection for any period up to 50 years, promised by new method of packaging. See page 112.

ACTION X-RAYS— Field emission technique used to study action of projectiles may lead to radiography of valve components in operation and other industrial subjects. See page 120.

WLB Prepares To Disband After Postwar Labor Policy Is Evolved

Management, union and government representatives to discuss new set-up for handling labor disputes at forthcoming conference. United States Conciliation Service expected to be built up within Department of Labor

EAGER to wind up their wartime service and move back to the companies, labor organizations and various institutions by which they normally are employed, members of the National War Labor Board have decided on a course of action aimed at complete liquidation of this agency. They hope it can be disbanded immediately after the pattern of postwar labor policy of the government is set at the coming management-labor conference to be held at the invitation of President Truman.

At a White House conference Secretary of Labor Lewis B. Schwellenbach and Secretary of Commerce Henry A. Wallace have been asked by the President to draw up the agenda of the meeting. Preliminary talks by the two secretaries have resulted in a tentative agreement that the meeting will be held in Washington, and that arrangements should be made in time to permit it to be held around Oct. 15.

Tentative plans provide for limiting attendance to a comparatively small number—possibly not to exceed 24. There is a possibility that the invitations to attend will be issued at the assignment of Eric Johnston, president, Chamber of Commerce of the United States; Ira Mosher, president, National Association of Manufacturers; Philip Murray, president, Congress of Industrial Organizations, and William Green, president, American Federation of Labor.

It is understood that the conferees will not be asked to renew their no-strike, no-lockout pledge since, in the administration's opinion, it would not be proper under our democratic form of government, to seek such a pledge now that the period of war emergency is over.

But all indications are that the administration will hand the conference a large assignment. It will ask for nothing less than a complete proposal as to what functions shall be set up by the government with reference to settling management-labor disputes in the postwar period. In a statement on Aug. 16, President Truman revealed a plan to build up the United States Conciliation Service in the Department of Labor, and this plan is to be submitted for discussion at the conference.

Under the President's executive order of Aug. 18, on reconversion, the NWLB will continue to function during this interim period. Under instructions in this order it is to approve wage increases during this period in order to correct gross inequities or maladjustments "which would interfere with the effective transition to a peacetime economy." At the same time, the President's statement of Aug. 16 made it clear that the NWLB is to serve only until the postwar government setup has been formulated at the coming conference. To carry out the President's program, and also to hasten their return to their normal activities, members of the board, according to an announcement by Chairman George W. Taylor, have agreed on the following policies:

1—The board has instructed its regional boards to redouble their efforts to decide speedily the approximately 3000 dispute cases now pending which were certified by the Department of Labor prior to Aug. 18. The regional boards will request the parties involved to try to settle their cases by direct negotiations under the revised wage stabilization policy which permits wage or salary increases without WLB approval as long as they are not made the basis of requests for price increases.

2—In new dispute cases the parties will be urged to reach agreement through collective bargaining procedure and without recourse to governmental procedures; if the parties involved cannot negotiate a settlement, they will be urged to refer the dispute to arbitration—where the dispute lends itself to this method of disposition. The regional boards of the WLB and the Department of Labor's Conciliation Service will work together to encourage the parties to try all means of reaching a settlement without recourse to the government.

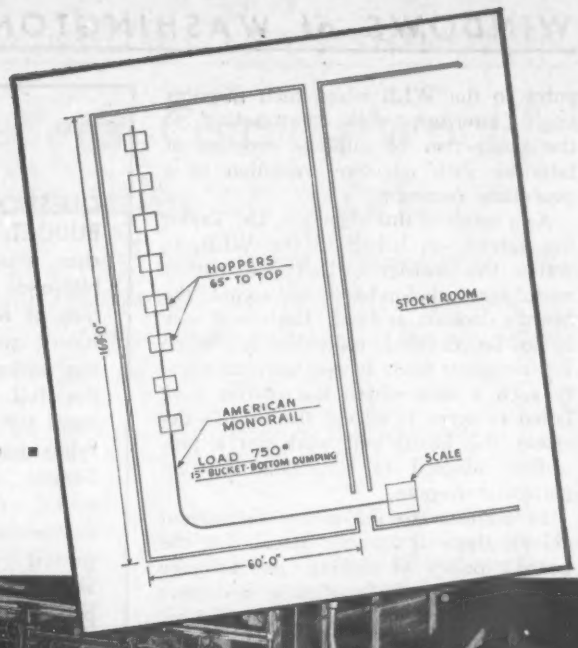
3—If the foregoing measures fail, the parties to a dispute should, if they desire further governmental participation in their settlement, agree to submit it to the War Labor Board for final and binding determination.

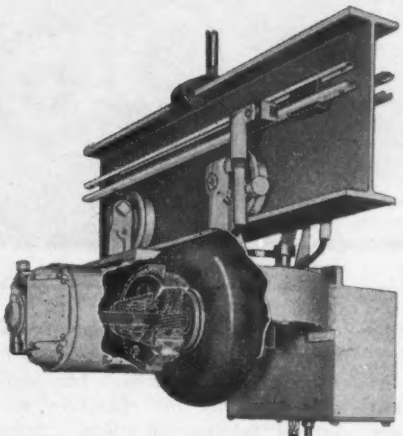
Originally the War Labor Board, largely to expedite liquidation of its program, declared its unwillingness to accept new dispute cases from the secretary of labor unless the parties in each case agreed beforehand that they would abide without question by the WLB's decision. Previous experience had demonstrated that when either of the parties in a dispute hesitates to accept the decision of the board, much delay results.

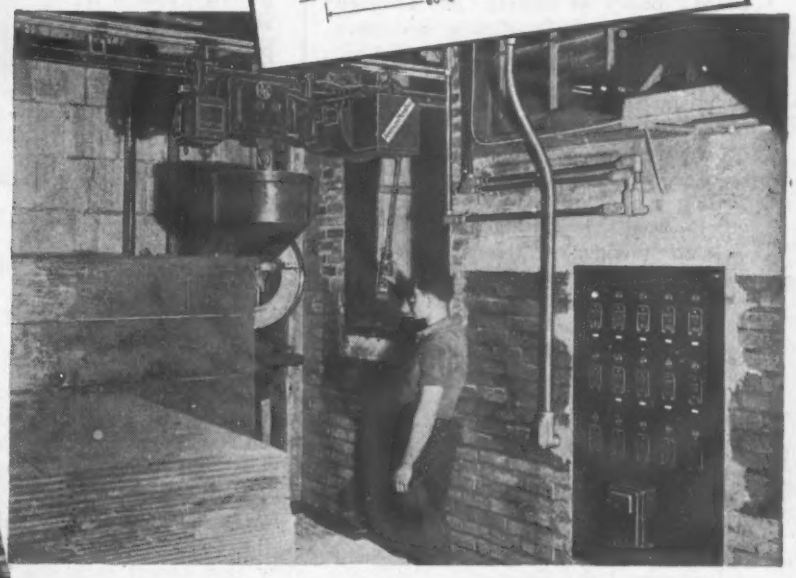
Judge Schwellenbach objected to this stipulation on the ground that the President's executive order of Aug. 18 left him no choice but to refer labor dis-

WOULD UP JOBLESS PAY: Sen. Harley M. Kilgore (Dem., W. Va.) is author of a bill which provides for the federal government to supplement state unemployment compensation payments up to $25 a week, in line with President Truman's recent recommendation. NEA photo

American Mono Tractor *Automatically* Feeds 15 Stations . . . . .







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putes to the WLB when such disputes might interrupt work contributing to the production of military supplies or interfere with effective transition to a peacetime economy."

As a result of this objection, Dr. Taylor has agreed, on behalf of the WLB, to waive the insistence that the parties must agree beforehand to accept the board's decision as final. Each case now is to be decided individually; "when the secretary finds it necessary to certify such a case where the parties have failed to agree to accept the board's decision, the board will work out a procedure adapted to settlement of that particular dispute."

In addition to the desire to prevent delays, there is another reason for the board's policy of asking an advance agreement that the parties to a dispute will abide by the board's decision. That is the board's fear that a wave of noncompliance might develop at any time now that the war is over. On numerous occasions WLB spokesmen have made it clear that the only authority for expecting "voluntary" compliance with its orders was the wartime no-strike, no-lockout pledge. Although President Truman, in his statement of Aug. 16, declared that "I shall expect both industry and labor in that period (the interim period) to continue to comply voluntarily, as they have in the past, with the directive orders of the War Labor Board," and although the President called upon both labor and industry to renew the no-strike, no-lockout pledge for the interim period, the fact remains that no such pledge is in existence today.

In other words, there is no means of enforcement today, particularly since the President has intimated that no more plant seizures would be ordered in cases of noncompliance. Without any basis for demanding enforcement, excepting upon moral or patriotic grounds, therefore, the desire of the board for advance agreements that its decisions will be accepted is readily understandable.

Uncertainty in Reconversion

This matter of obtaining compliance might be complicated in the near future by the board's authority to grant wage increases even when they might force price increases. Dr. Taylor recently indicated that even the Little Steel formula now may be thrown out the window. In looking ahead to the immediate future it is generally realized that the reconversion period will be a period of uncertainty at best and, while great prosperity generally is expected in the real postwar period ahead, the reconversion period may reflect decided changes in attitude from one week to another. For instance, a wage increase that might seem desirable today might seem less desirable a week or so ahead, or a wage increase that looks good today might seem too small in the near future. In such a fluid situation noncompliance with WLB orders might reach substantial proportions.

QUESTIONS JOB BUDGET: Ira Mosher, president, National Association of Manufacturers, questioned the workability of the full employment bill in testifying before the Senate Banking and Currency Committee, suggested that it would put a brake on free enterprise. NEA photo

Although the War Labor Board is about to sing its swan song, the imprint of its handiwork is registered permanently upon the pattern of management-labor relations. Many policies which it initiated or encouraged are reflected quite generally in the country's industries.

For instance, the War Labor Board, at the beginning of the war, took the view that annual vacations increase the efficiency of factory workers. Its investigations appeared to prove that output of war plants increased when the workers had vacations. Many of its decisions, therefore, provided for paid vacations ranging from one week for those in service one year or more, up to two weeks for those in service five years or longer. Under this policy, paid vacations for factory workers have become rather general during the war and may be expected to continue so in the postwar era.

The WLB also gave its blessing to incentive wage systems. It threw out many so-called "phony" demands where straight pay increases were recommended under the guise of being aimed at increased production. The WLB uniformly gave its approval to incentive wage systems where it could be shown that increases in pay to the workers increased production without increasing unit labor costs.

The board also established a policy of paying higher wages for night workers than day workers. It evolved a general rule of allowing a differential of 5 cents an hour for the second shift and of 10 cents for third shift — with variations in communities which had established differentials before the board acted. The board believed the differentials not only were necessary to man the night shifts at war plants, but that they were warranted because of their disruption of normal living habits.

The biggest postwar effect, in the opinion of some WLB members, will result from the big push given by the board to job evaluation. Employers had to come before the board with descriptions of the various jobs in their plants and offices; they had to define the duties that went with each job and explain, for example, the difference in work done by class A and class B stenographers. As a result, board members feel, there is a better understanding among employers than ever before of the value of jobs, and of the qualifications required to fill each job. Many inequities in compensation have been corrected, and many employees have been promoted to higher paying jobs. From this spade-work, board members feel, will come a more efficient utilization, and a fairer compensation, of labor in the future.

WLB spokesmen point with pride to their record of accomplishment. In 1944 time lost from labor disputes, they point out, was 0.1 per cent of total hours worked whereas in 1937 the time lost from disputes was 0.5 per cent or five times as much. In the years 1939, 1940 and 1941 the average strike lasted 20.5 days; in 1944 it lasted 5.5 days. WLB members are not at all dismayed on being reminded that there were 4496 strikes in 1944—the largest number in history; they reply that there were more people working in 1944 than ever before in history and the chances for strikes thus more numerous.

WLB spokesmen contend also that

the pay increases they authorized were much smaller in amount than popularly supposed. Their statistics show that the average increase they allowed in disposing of about 500,000 applications during the entire war was close to 6 cents an hour. The average increase they allowed in settling some 18,000 dispute cases was about 5 cents an hour.

Steelworkers Wait for Report on Annual Wage

United Steelworkers of America-CIO will not renew its demand for a guaranteed wage in the steel industry in the immediate future but will wait until such time as the director of war mobilization and reconversion, William H. Davis, submits a report as called for last year by President Roosevelt. All that the USA-CIO has in mind at this time in reopening contracts in the steel industry is to take up the possibility for higher wages as permitted under the Aug. 18 executive order by President Truman.

Arthur S. Meyer and Murray Latimer, recently appointed by the OWMR's advisory board, at the suggestion of a study committee headed by Eric Johnston to do the research work on the guaranteed wage proposal, are still in the organizational stage. Indications are that considerable time, at least six months to a year—and perhaps longer—will be required to reach any sound conclusions as to the practicability of the guaranteed wage plan if adopted by any important cross-sections of industry. To permit a successful guaranteed wage plan, for example, a certain degree of economic stability is regarded as essential; to cover the subject matter thoroughly, therefore, it may be necessary to spread the study out to include a wide range of economic experience and information.

The study is to be conducted along two lines. Mr. Meyer is slated to explore the possibilities in conferences with representatives of industry. Mr. Latimer will study the possibilities as they may be revealed by analysis of economic factors involved.

Philip Murray, president of the United Steelworkers, as well as of the CIO, is actively associated with the supervision of the guaranteed wage study; he is a member of the study committee at whose suggestion Messrs. Meyer and Latimer received their appointments.

Recovers 81 Per Cent on Surplus Marine Item Sales

New and used surplus marine property disposals, including transfers to other agencies, amounting to $11,599,746 with reported returns of $9,385,275 for a recovery of 81 per cent of reported cost were announced last week by the United States Maritime Commission for year ended June 30, 1945. Inventory balance on that date was $8,845,311.

Proposed Federal Catalog Would List All Commodities on Market

Listing would include some 5 million items. Designed to provide more systematic records and procedures for government procurement, statistical and accounting agencies, but would be adaptable for use by private industry

CONGRESS this fall will be asked for authorization and an appropriation to permit execution of a project which not only will make for more efficient statistical work and bookkeeping by federal agencies but which should prove of value to private industry. This is the preparation of a United States Standard Commodity Catalog to list millions of commodities which the federal government now procures. Inasmuch as the federal government today buys every product that is produced, the proposed catalog will list every product that is on the market.

The move to compile a United States Standard Commodity Catalog originated in a letter in which the late President Roosevelt, on Jan. 18, 1945, pointed out that the government was in need of more systematic records and procedures for use in all transactions requiring a description of items of real and personal property.

"The large number of actions relating to the acquisition, care, use, and disposal of federal property," he wrote, "has greatly accentuated the need for this improvement in governmental practices, both for the effective prosecution of the war and for the more orderly conduct of peacetime affairs . . . . This plan should include a uniform property classification and a uniform item identification system, covering all commodities . . . . for use throughout the government in all relevant activities involving the procurement, storage, issue, disposal, or intra-government transfer of property, the listing or cataloging of property, and the collection and tabulation of commodity information."

Valuable to Private Industry

While the contemplated United States Standard Commodity Catalog is to be compiled specifically for use by government procurement, statistical and accounting agencies, those working on the project say that the catalog will be of great usefulness to companies in private industry which frequently spend hundreds of thousands of dollars to work up identification systems for controlling production, sales and inventory, and for compiling needed statistical records. When the new United States catalog is published, Budget Bureau spokesmen say, private companies will find it a complete list of commodities, and commodity identification numbers, available at the price that will be charged for copies of this book when available from the Government Printing Office. Furthermore, the work will be kept up-to-date as a result of continuous study by a permanent inter-agency board.

The undertaking breaks down into two distinct jobs. One is the actual creation of the catalog. The magnitude of this endeavor can be suggested by explaining that the new work is to supersede 17 existing federal catalogs which have been compiled in years past by such agencies as the Treasury Procurement Division, the Army Quartermaster, the Army Surgeon-General, the Army Air Forces, Navy Bureau of Ships, etc. The 17 existing catalogs list some 5,000,000 items altogether.

How long it will take to replace these existing lists by one comprehensive catalog can only be estimated. There not only is a huge amount of strictly clerical work to be done. In addition, careful checks will have to be made with manufacturers, engineers and others from private industry, as well as with representatives of all the interested federal agencies, to make certain that all products, particularly new products, are listed. Assuming that Congress authorizes the work, and grants an adequate appropriation without delay, it probably will be 1947 or 1948 before the unified catalog is published.

Commodity Classification Revision

The other of these two jobs is that of bringing up-to-date the United States Standard Commodity Classification. Fortunately, most of the spade work in setting up such a classification has been done as a result of co-operation by the Bureau of the Budget, the War Production Board and the Treasury Procurement Division early in the war. This led to the publication, in 1943, of the current Standard Commodity Classification, Vol. I, and, in 1944, of Standard Commodity Classification, Vol. II. The first volume combines related products into consistent and logical groupings of commodities—as iron and steel scrap, metallic ores and concentrates, steel, ferro and nonferrous additive alloys, nonferrous metals, fabricated metal basic products, general-purpose industrial machinery and equipment, electrical machinery and apparatus, metalworking machinery, etc. These listings are selected only for purposes of illustration; the book lists approximately 30,000 classes of products. The second volume covers the same ground as the first volume; it is an alphabetic index of the items, listed in Volume

Huge Reconstruction Job Posed by

Industrial areas largely ruined by Allied bombing attacks. Cost of rebuilding Berlin alone estimated at 10 billion marks. Defeated enemy lacks tools to tackle task. Much equipment taken by Russians. Preliminary rehabilitation underway. Railroads have lost cars, locomotives and other equipment

By GEORGE R. REISS
Editorial Correspondent, STEEL

GERMANY's big cities have been virtually crushed under an avalanche of high-explosive and fire bombs. They represent the world's greatest disaster—and the biggest reconstruction job in history—a building equipment salesman's dream.

If Germany is to become an industrial nation again, those cities will have to be rebuilt, and in most, that means a complete rebuilding job. There's so little left of most of these cities that one newsman aptly put it:

"What's the use of trying to rebuild? It would be cheaper to cover over the wreckage and build new cities somewhere else."

Recently, I flew a 20,000-mile air tour of Europe, which took me into or over most of Germany's larger cities and I found them a monotonous succession of ruins, wreckage as complete as that in the ruined city of Pompeii, and on a much grander scale.

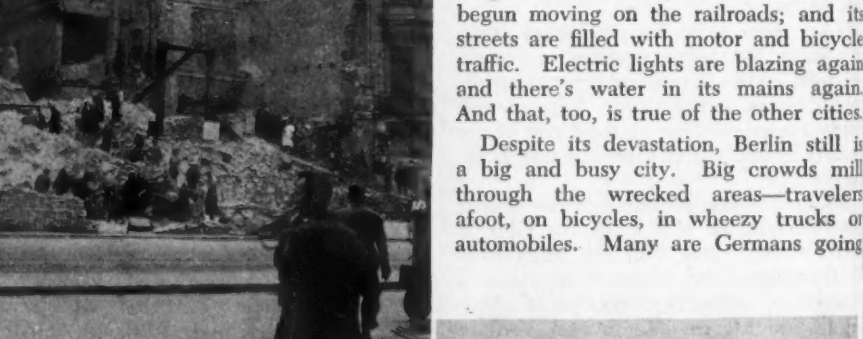
For example, Berlin, the world's fourth largest city is also the world's most thoroughly smashed city—unless it is equalled by Tokyo. It is also the No. 1 object lesson of the fury of air power.

Berlin is symbolic of the destruction wrought in other German cities. Hamburg, once a proud port city of 1,800,000, is 85 per cent destroyed; Bremen, Germany's second port city, is half wiped out; virtually all of Cologne, "capital of the Ruhr Valley" and the biggest concentration of heavy industry in the world, is almost entirely down; in Dortmunde, only 2500 of the 50,000 homes still remain standing.

Hardly an acre of Greater Berlin, a city of some 4,400,000 people, escaped some damage—and most of those acres were pounded to rubble. U. S. Strategic Air Forces, bombing with pin-point tactics by day, smashed factories and rail yards and rail stations; the Royal Air Forces, using night area bombing tactics, smashed cities, on the theory that workers, killed, wounded or made homeless, wouldn't do their bit in the factories. Their ideas apparently worked. For Germany was completely paralyzed, industrially, when the war ended.

Berlin today is trying to make a comeback, just as is virtually every other German city. But it is still a wilderness of wreckage that once was fine buildings. It still has the smell of fire and decaying bodies in the air. But the street cars, subways and busses are running after a fashion; a few trains have begun moving on the railroads; and its streets are filled with motor and bicycle traffic. Electric lights are blazing again and there's water in its mains again. And that, too, is true of the other cities.

Despite its devastation, Berlin still is a big and busy city. Big crowds mill through the wrecked areas—travelers afoot, on bicycles, in wheezy trucks or automobiles. Many are Germans going



Bucket brigades of women clean up rubble in Berlin, above. A lack of modern equipment to help in a reconstruction program in Germany, formerly one of the most highly mechanized countries of the world, is one of the paradoxes of the war. At right is a wrecked oil refinery at Hamburg

by Bombed Cities of Reich

about their normal business; the big bulk is composed of refugees, many dragging their meager belongings on crude carts or carrying them on their heads.

A Berlin newspaper, *Berliner Zeitung*, recently estimated cost of repairing or rebuilding Berlin's wrecked homes and business and industrial buildings will cost 10 billion marks (the mark's prewar exchange rate was 40 cents) at prewar construction costs, or about half the cost of all new dwellings built in all Germany from 1924 to 1937.

It reported Greater Berlin had had 1,500,000 dwellings in the spring of 1939; by the summer of 1944, bombings had destroyed 400,000 and damaged 800,000 others—and Berlin had suffered its worst damage after the summer of 1944, in this spring's air raids by Allied forces.

Reconstruction Has Started

Already Berlin has begun reconstructing. A contract for reconstructing the Air Ministry building, one of Berlin's largest and least damaged structures, has just been awarded a German firm. One thousand workers were put on the job, repairing the building for use as headquarters for occupying forces. It is estimated 40 per cent will be finished by September, the building will be restored in about one year.

Rudolph Luebeke, commercial manager of the Reichsmetal Borsig Corp., a big Berlin concern which made boilers, tank parts and numerous other war materials, estimated his company suffered 127 million reichmarks damage in bomb raids in its seven Berlin area plants.

One of the most acute reconstruction problems facing Germany, even for the immediate task of trying to rig up homes for the millions of homeless, will be lack of tools and equipment. Much of Germany's construction tools and equipment was used for war work; little new equipment was made during the war but much was destroyed—and now the Russians and other occupying forces are taking much of what is left.

But the Germans are doing their best with what they've got. For example, in Berlin, I saw bucket-brigades of women trying to clean up the rubble. One fills a bucket, passes it to the next woman—and it goes from hand to hand—a slow process.

But the same kind of a job is going on elsewhere in Germany—and slowly but surely the rubble is being cleaned out of the streets, pavement is being patched up, and bricks are being piled up neatly in the doorways or windows of the shattered buildings.

In Berlin, before the war, more than 500 long distance trains had originated daily for various parts of Europe; the bombing raids were so effective that this was cut to only two or three trains daily at the worst of the raids. Most of the trains operating in and out of Berlin still are being used only for Russian troop movements, although an occasional milk train—usually equipped with a locomotive resurrected from the scrap pile—gets through now.

Some executives of the Reichsbahn, the German national railway system, estimated that the railway system into Berlin could be rehabilitated sufficiently to care for present needs in five to six months—if materials, equipment, and manpower were available; but he assured it will not be.

"Why not?" he was asked.

He shrugged unconcernedly. It developed the Russians have thoroughly stripped the railroads within the territory they occupy. They've taken the best cars, locomotives, even the signal systems, and they're doing the same with the industrial plants.

Luebeke told us even after the bombers got through working over his plants, it had had 1500 machine tools left in various stages of operating condition—lathes, drop hammers, planers, cutting machines, shapers and so on. The Russians moved in, carefully packed up and shipped back to Russia 1400 of these, valued at 30 million marks. The other 100 aren't in very good shape.

Had Developed New Jet Engine

We also visited the BMW's Spandau Works in Spandau, a Berlin suburb. This plant which had had 6800 employees and had made engines for Focke-Wulfe 190 fighter planes, had just developed a new jet engine, designed for a new type Nazi fighter plane.

Executives at the plant explained that the Russians had taken many completed parts for the engine, drawings and equipment, and had invited Walter Schile, chief engineer, to come to Russia, to direct them in building the engines. Schile, they explained, had demurred—then disappeared unexplainably several days before our visit.

Hamburg was a No. 1 target in Germany for the bombers—chiefly because of its big oil refineries, shipyards, and submarine pens—and also because it was the biggest city in Germany that the air bombers could reach easily before they got Berlin's range. Hamburg had seven huge refineries—and oil was the top priority target; it also had four of Europe's largest shipbuilding yards. All seven refineries have been thoroughly smashed to junk—including one that had been a German-American financed concern before the war. An estimated 43 large ships were smashed or sunk in the raids on Hamburg harbor, while hundreds of U-boats in various stages of fabrication were destroyed on the docks or in the water. Besides hundreds of smaller vessels—tugs, barges or small self-propelled cargo vessels—were sunk or wrecked in the harbor. One of the wrecked vessels was a new passenger ship, larger than the huge *Europa* or *Bremen*, which was to be Germany's largest ship and a new flagship for the Hamburg-American line. Today she's a rusty hulk, pierced by bomb bursts in many places, twisted grotesquely out of shape. Incidentally, we saw the huge *Bremen*, a 49,000-ton vessel that used to ply between New York and Germany, lying half sunk on her side at Kiel, along with the wreckage of many other vessels. The *Europa* is silted in at Bremerhaven and will be soon put into service as a troop ship for the Allies.

GEORGE R. REISS

Who recently returned from a 20,000-mile tour over Germany and other parts of Europe. Mr. Reiss is business editor of the Youngstown, O., Vindicator and editorial correspondent for STEEL

This is the first of a series of articles recounting the author's observations on a recent 20,000 mile tour of Europe, part of it by airplane and part by jeep. Mr. Reiss visited London and in Germany toured Hamburg, Brunswick, Munich, Sulzburg, Berchtesgaden, Regensburg, Nurnberg, Schweinfurt, Bad Kissingen, Frankfurt and Berlin. His trip also took him to Oslo, Norway; Copenhagen, Denmark; Paris and Marseille, France; Naples, Venice, Milano, Verona, Florence and Rome in Italy.

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By A. H. ALLEN *Detroit Editor, STEEL*

MIRRORS of MOTORDOM

First automobile builders to resume passenger car production plagued by labor troubles. Excuses given for walkouts flimsy, but apparent cause is desire of unionists to obtain increase in hourly rates to offset shorter work-week

DETROIT

MONTHS before the termination of war production in the automotive industry, many of its top executives were giving serious thought to their immediate postwar labor problems and they were frank to admit some troublous times seemed in the making. Developments of the past two weeks bear out their concern, and if a postwar pattern for labor is now being traced in Detroit, then the outlook for the future, in a word, ain't good.

Ford and Hudson, the first two producers to get assemblies rolling, are both stymied at the moment by virtue of strikes, and the virus of unrest is spreading throughout plants in this area. Walkouts are based on the flimsiest of excuses, but basically stem from the fact working people apparently have decided they will not remain on the job unless their wartime wage level is maintained. This patently is not in the cards, yet union leaders seem to imagine they can enforce it by calling out their sheep.

Supplier's Strike Closes Ford

The Ford shutdown, for example, is the result of a protracted strike at Kelsey-Hayes Wheel Co., supplier of wheels and brake drums to the Ford assembly line. There has been no opportunity to build up a decent bank of parts at Ford, so the Kelsey strike was not many days old before lines at the Rouge were forced to close, just at the moment they were building up steam to get production to a respectable level. On the face of it, the Kelsey strike is said to result from the refusal of the company to reinstate a handful of employees who last April literally tossed a couple of foremen out of the plant because they did not like them.

The company's position is clear. There is no question of working hours—of rates of pay—or working conditions. It is solely and simply a matter of the right and ability of Kelsey to control and discipline its employees when acts of violence are involved. At least that is what the company maintains in advertisements which it released over last week-end. But there is a suspicion that much more actually is involved, not only at Kelsey-Hayes, but at all plants in the industry. It is briefly this: Working people, perhaps at the instigation of union leaders who are always looking for some excuse to develop a "fighting cause," are walking off their jobs because they are not receiving the take-home pay which war jobs had provided, and they are throwing their lot in with union demands for a 30 per cent increase in basic wage rates, which would bring their gross weekly earnings up near the point enjoyed during the wartime period.

This is not going to work. But in the meantime, Detroit is wondering how many protracted plant shutdowns will be necessary to convince employees their unreasonable demands just are not in the cards. Today it is only Ford and Hudson which are closed, with thousands laid off because of labor unrest. Tomorrow it may be General Motors, Chrysler, Packard and all the rest which are closed just as their assembly lines near the point of providing the jobs which all America is asking. If this is going to be the pitch, there is small use talking about full employment or any of the other panaceas for working people currently being aerated. If the jobs are there, and the working force doesn't want them because they are not on their terms, then it is best to forget about the whole thing.

Forgetting these more mundane matters for the moment, it may be of interest to take a squint at the future prospects of the automotive industry through the eyes of a New York observer, E. F. Hutton & Co., which obviously channelizes its outlook in terms of security values and earnings prospects, but which nevertheless may contribute something to the overall outlook. At any rate, the company avers that a survey of prospects of the industry points to the possibility of some important surprises, the first of which is a real comeback effort by Ford, which has been discussed in these columns at an earlier date. The second, according to the Hutton crystal-gazers, is the speed with wh.ch the industry gets production up to the optimum levels. They figure it this way:

	1946	1947	1948	1949
	(passenger car units in millions)			
Estimated demand beginning of year	15.0	11.6	7.6	3.4
Estimated production	6.2	6.8	7.0	3.4
Estimated deferred demand — year-end	8.8	4.8	0.6	0
Estimated normal demand	1.8	2.8	2.8	2.8

The Hutton statisticians go on to say that during the war years a number of independent producers in the industry have been given a blood transfusion through large war orders. Financial positions have been improved and skilled personnel acquired. Through the existing "sellers" market for cars, some of these smaller producers hope to improve their competitive position sufficiently to enable them to build a dealer organization to withstand future cyclical changes, but as the foregoing tabulation suggests, the time in which to do so may be greatly shortened, should present intentions be fully realized. At the end of three years, the industry would return to normal demand burdened with huge excess capacity, and only those companies with the strongest financial position could hope to maintain

Orville Wright, left, and Sen. Homer Ferguson of Michigan inspect the first new Hudson passenger car to roll off the assembly line at the company's Detroit plant. NEA photo

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their competitive position. Therefore, postulates Hutton, Chrysler offers the best opportunity for capital appreciation and the shares of marginal producers, as a group, are over-valued marketwise.

A new aircraft engine, rated at 200 horsepower, has been developed by the Research Division of the General Motors Corp. Designed for installation in private air cruisers of the future, the new engine is an outgrowth of studies started eight years ago—and subsequent war contracts—in connection with the development of military robot planes.

The engine has undergone extensive flight testing for six years and is considered an important contribution to aircraft development.

The new engine is a radial type having four cylinders and operates on the two-cycle principle. Its unique feature is that a supercharging blower is used to increase performance and power reserve for take-off and altitude. There are no valves, this function being performed by the pistons themselves. Although the piston displacement is only 250 cubic inches—the size of an automobile engine—it develops normally 200 horsepower with a high safety factor, and the weight dry is only 275 pounds. It is probably the only small engine having liquid cooling and may be installed for the same weight as an air cooled engine. It is only 35 inches in diameter.

Oil consumption is extremely low, a quart of oil serving for six hours' running. Fuel consumption is comparable to engines of similar power, about 13 gallons an hour using 91 octane fuel.

Plans for erection of a manufacturing plant near Elyria, O., have been announced by C. E. Wilson, president, General Motors. The plant will be occupied by a new division which will produce products similar to those produced in Syracuse, N. Y., prewar.

The new plant will be situated on 175 acres on the New York Central Railroad's main line near the Elyria-Milan road. Construction will start when materials are available. The plant will include 400,000 square feet of manufacturing floor space and an administration building. It is expected the plant will be in full operation in about a year and it will, when operating fully, employ approximately 2000 people. Hub caps, bumper guards, grilles and similar products will be manufactured.

Mr. Wilson said General Motors is planning to turn over the plant at Syracuse, now operated by the Brown-Lipe-Chapin Division, to the Harrison Radiator Division, which will produce car heaters, defrosters and similar products. This multiple-story plant is more suited to the manufacture of these parts than of the products to be manufactured at Elyria.

It will be several months before the plant at Elyria will be ready for occupancy and it will be about the same length of time before the new products can be produced in Syracuse.

New pictorial instructions used to streamline wartime training of thousands of G.I. mechanics are being put to work to simplify peacetime installation and service problems for the nation's automotive mechanics. Displacing older types of complex engineering drawings and lengthy written instructions, a new "installograph" developed by the Bendix Products Division, Bendix Aviation Corp., allows auto service men to grasp at a glance the "how to install it" information they need to give fast, efficient service to vehicles employing Bendix brakes, carburetors, hydraulic systems, etc.

Magnets for Cyclotrons Involve Precise Casting and Finishing

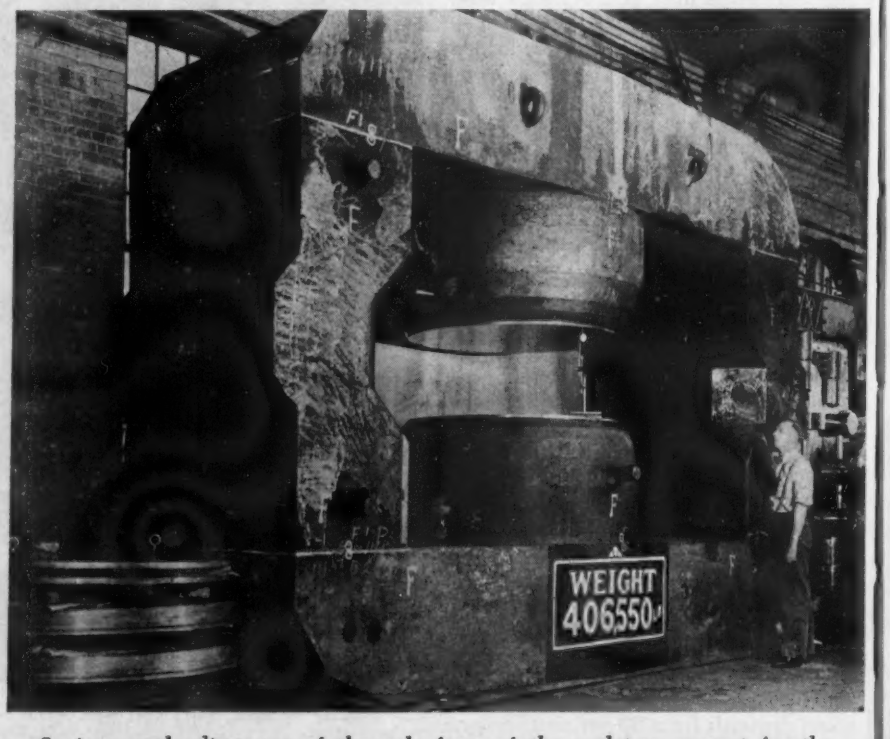
MAGNETS for the "atom-smashing" cyclotrons, which were basic to research leading to the harnessing of atomic power, are estimated to constitute 99 per cent of the weight of the complete cyclotron. The casting and finishing of these magnets involve precise and delicate work.

A cyclotron magnet is made in the form of a great hollow square of steel. From the top and bottom members of the square, the poles of the magnet—large heavy disks supported by heavy steel necks—project toward the middle of the square. Ordinarily the magnet is cast in six pieces, the four members of the hollow square and the two disks with their supports.

Even the first step in producing such a large magnet involves many difficulties. The magnet of the Carnegie Institution of Washington cyclotron, for example, weighs 406,550 pounds. Castings for this magnet were made by the American Rolling Mill Co., Middletown, O. Castings were made of high-grade carbon steel and had to be perfect, without fractures, blow-holes or other flaws. Once cast, they were examined by X-ray, and if a fault had been found it would have been necessary to make new castings.

Mosler Safe Co., Hamilton, O., was given the job of finishing the castings. The faces of the two great poles, which were 42 inches in diameter, had to be absolutely smooth and parallel so that all magnetic lines of force would travel in exactly the same direction. Since the speeding electrons, by nature, travel precisely perpendicularly to the magnetic field in which they move, crooked plates and a resulting angled magnetic field would cause the electrons to deviate from their pure circular motion, hit the walls of the acceleration chamber of the cyclotron and disrupt the generation of the beam.

Fifteen men worked for five months finishing the Carnegie magnet, first with silica carbide then with emery wheels and finally polishing by hand. When finished to watch-like precision, the magnet was dismounted, shipped to the Carnegie laboratory and reconstructed there. The cyclotron was then assembled around the magnet.



Surfaces and adjustment of the pole faces of the cyclotron magnet for the Carnegie Institution of Washington are checked in the shops of Mosler Safe Co. where the magnet was machined

DESIGNING FOR DIE CASTING

RIBS

In designing die castings, consider the use of ribs where one or more of the following results are desired:

1. *Maximum strength, especially in resistance to bending.*
2. *Decreased weight.*
3. *Avoidance of warpage under stress.*
4. *Uniformity in section thickness.*
5. *Adequate stress distribution.*
6. *Assurance of filling out thin sections.*

All of these results have been obtained in the ZINC Alloy Die Casting for the aircraft machine gun mount shown here. Through the intelligent use of ribs, this casting has ample strength with a minimum section thickness—thereby decreasing weight and cost. The section thickness is substantially uniform and the chance of warpage is minimized. The ribs also help to distribute stresses applied at the steel shank which has been cast in place at the center of the casting. This shank serves as a pivot pin on which a pair of guns and their mounts are supported and about which they rock.

For more detailed information on this and other design considerations which will enable you to get the most for your die casting dollar, ask us—or your die casting source—for a copy of DESIGNING FOR DIE CASTING.

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MEN of INDUSTRY

WILLIAM E. ZIPP

T. A. MOORMAN

K. H. GAYLE JR.

William E. Zipp has been appointed vice president in charge of sales, Manufacturing Division, Ceco Steel Products Corp., Omaha, Nebr., and he will have his offices at that division's plant in Cicero, Ill. Mr. Zipp has been manager of sales since June, 1944, and he joined the company in 1933.

—o—

Henry A. Bourne recently was appointed sales manager, Republic Steel Corp., Cleveland, in the Tulsa district. Mr. Bourne, who joined Republic in 1943 as a salesman in that district, succeeds the late **Hoyle Jones.**

—o—

Stanley P. Watkins has been named manager, Market Development Division, Rustless Iron & Steel Corp., Baltimore. He succeeds **W. B. Pierce** who has resigned. For the past year Mr. Watkins has been manager, sales engineering department, and prior to that time he was head of the sales development department, serving also as an engineer in that department. He joined the company in 1931.

—o—

Donald L. Chaffee has joined the sales engineering department, Copperweld Steel Co., Glassport, Pa. Mr. Chaffee comes to Copperweld from the wire branch, Signal Corps Engineering Laboratories, U. S. Army, Camp Coles, N. J.

—o—

J. K. Miller, formerly assistant director, Ferroalloy and Alloy Steel Branch, War Production Board, Washington, is returning to Bethlehem Steel Co., Bethlehem, Pa.

—o—

J. W. Graves, for 12 years with American Steel & Wire Co., Cleveland, and more recently with Central Steel & Wire Co., Chicago, has joined the staff of the Great Central Steel Co., Chicago.

—o—

C. R. Bottenfield, superintendent, Fairfield, Ala., tin mill, Tennessee Coal, Iron & Railroad Co., Birmingham, has been named general superintendent in charge of the tin mill and sheet mill. **R. E. Sturdy** continues as superintendent of the sheet mill and **A. H. Chalmers** becomes superintendent of the tin mill. **E. F. Harris,** formerly assistant chief metallurgist, succeeds Mr. Chalmers as assistant superintendent, tin mill.

—o—

T. A. Moorman has been named manager, Allegheny Ludlum Steel Corp., Forging & Casting Division at Ferndale, Mich. Mr. Moorman was one of the founders of that division in 1929, and has been associated with it since that time except for the past two years during which period he served as manager of the company's Los Angeles plant.

—o—

H. J. French, assistant director, Raw Materials and Facilities Branch, Steel Division, War Production Board, Washington, is returning to International Nickel Co., New York. He will be succeeded by **Alex Miller.**

—o—

Harry A. Winne, vice president in charge of engineering, General Electric Co.'s apparatus department, has been appointed vice president in charge of the company's engineering policy. **Ernest E. Johnson,** assistant engineer, Aeronautics & Marine Engineering Division, has been named successor to Mr. Winne. **C. L. Crow** has been named manager, marine section, Pacific District Industrial Division.

—o—

W. S. Dawson, recently appointed first vice president and general manager, Romec Pump Co., Elyria, O., has been elected president, succeeding **H. D. Stecher,** resigned.

—o—

H. Wickliffe Rose has been elected president, American Tariff League, New York. Mr. Rose is assistant to the president, American Viscose Corp., Wilmington, Del., and he succeeds **Frederick K. Barbour,** president, Linen Thread Co, Inc., New York, who has become chairman of the league's executive committee. **Roy C. McKenna,** chairman, Vanadium-Alloys Steel Co., Latrobe, Pa., was elected first vice president; **Wheeler McMillen,** editor-in-chief, *Farm Journal,* was elected to the executive committee. New board members include: **J. H. Schermerhorn,** president, Joseph Dixon Crucible Co., Jersey City, N. J. and **D. Joseph O'Connor,** vice president, Acme Shear Co., Bridgeport, Conn.

—o—

Kenneth H. Gayle Jr. has been elected vice president in charge of Northern Division sales and exports, Ingalls Iron Works Co. and its subsidiary, Steel Construction Co., Birmingham. Mr. Gayle has served as Northern Division sales manager since 1939 and export manager since early last year. He established the companies' offices in New York as district manager in 1927 and has been in charge there since that time except for a short period when he was general manager of the Ingalls fabrication plant at Verona, Pa.

—o—

A. Carl Tiedemann recently was elected president, Dockson Corp., Detroit. Mr. Tiedemann joined the corporation less than a year ago as executive vice president and general manager.

—o—

Brig. Gen. Tom C. Rives, returning to Wright Field, Dayton, O., after an absence of nine years, has been named chief, radio and radar subdivision, Engineering Division, Air Technical Service Command. He replaces **Col. Hobart R. Yeager** who is now enroute to a station in the Pacific.

—o—

Sigfried A. Olson Jr. has been named industrial manager at Stockholm, Sweden, Brown Instrument Co., Philadelphia, a division of Minneapolis-Honeywell Regulator Co. Mr. Olson has been New York sales engineer for the Brown company for the past nine years.

—o—

Eric S. Carlstein has been appointed general manager and assistant to **Byron F. Bower,** president, Pines Engineering

E. D. WACKER

ROBERT S. MARS

Co., Aurora, Ill. Mr. Carlstein formerly was chief engineer, Batavia Metal Products Corp. **C. F. Coats,** previously with Western Condenser Co., Watseka, Ill., has been appointed purchasing agent.

—o—

E. D. Wacker recently was appointed general manager C. J. Tagliabue Division, Brooklyn, N. Y., Portable Products Corp. Mr. Wacker for the past eight years has been general sales manager and has been associated with the Tagliabue Division for 22 years.

—o—

Youngstown Fireproofing Co., Youngstown, O., has re-elected its officers who are: **W. H. Foster,** chairman; **G. C. Brainard,** president; **Walter Bender,** vice president in charge of operations; **E. A. Purnell,** vice president in charges of sales, **George R. Farrell,** vice president in charge of purchases; **W. D. Skinner,** secretary-treasurer; and **D. K. Phillips,** comptroller.

—o—

Frederic S. Cross has been appointed chief resident legal counsel, Glenn L. Martin Co., Baltimore. Since 1941 Mr. Cross had been resident representative of the company's general counsel, Jones, Day, Cockley & Reavis, Cleveland.

—o—

Norman Wunderlich has been named executive sales director of radio equipment and allied products, Federal Telephone & Radio Corp., Newark, N. J. Formerly he was with the Galvin Mfg. Corp., Chicago, where he was manager of the Communications & Electronics Division.

—o—

Capt. Ralph L. Tompkins, recently transferred to inactive duty by the Marine Corps, has been appointed manager, White Plains, N. Y., branch, Mack Trucks Inc., Long Island City, N. Y.

—o—

Arnold H. Smith has been appointed director, foreign department, Monsanto Chemical Co., St. Louis, succeeding **Herbert M. Hodges** who is retiring Oct. 1. Mr. Smith will be succeeded as assistant director of the foreign department by **Marshall E. Young,** formerly general export manager. **John E. Gurvin,** plant engineer at Monsanto, Tenn., has been advanced to vice president, Merritt Engineering & Sales Co. Inc., Lockport, N. Y., a Monsanto subsidiary. **H. J. Heffernan** has been named assistant general manager of sales, Merrimac Division, Boston. He suceeds the late **Horace Burrough III. J. J. McCarthy** has been promoted to division sales department as manager of textile sales development. Three assistant sales managers have been advanced to sales managers of their respective departments: **W. R. Minchin,** heavy chemicals department; **T. C. Jesdale,** Organic & Phosphate Division; **P. O. Huntington,** Merrimac Division's alcohol department.

—o—

Robert S. Mars, partner and general manager, W.P. & R. S. Mars Co., Duluth, machine tool distributor, and a director from the eighth district, United States Chamber of Commerce, recently was appointed to the Labor Relations Committee and Domestic Distribution Deportment Committee of the national chamber at Washington.

—o—

Col. Ralph L. Hart, until recently with the office of chief signal officer, Washington, has returned to Western Electric Co., New York, as distribution manager, Telephone Sales Division.

—o—

Richard E. Marx, has been appointed a vice president, Detecto Scales Inc., Brooklyn, N. Y., and will continue as sales manager, Infants & Clinical Scale Division.

—o—

Harry M. Francis has returned from three years' service, War Production Board, Washington, to resume his duties as assistant vice president, sales, American Steel & Wire Co., Cleveland. He served in the WPB as deputy director, Steel Division. Mr. Francis joined American Steel & Wire Co. in 1915 and held various sales posts in Philadelphia, New York, Boston and Cleveland, before being appointed assistant vice president in December, 1938.

—o—

Walter P. Jacob has resigned as president, General Bronze Corp., Long Island City, N. Y.

—o—

Carl P. Sorenson recently was appointed consulting standards engineer, Cherry Rivet Co., Los Angeles. He formerly was with Glenn L. Martin Co., Baltimore.

—o—

John P. Barclay, who served as chief, Wire Rope and Strand Branch, War Production Board, Washington, has returned as president, Wire Rope Corp. of America, New Haven, Conn.

—o—

Capt. Ralph E. Lee, recently discharged from the Army Air Corps, now is manager, export department, Trane Co., LaCrosse, Wis.

—o—

R. H. McMann has been appointed eastern district manager, Home Radio Division, Westinghouse Electric Corp., Pittsburgh, and will have his headquarters at the company's New York offices. He formerly was procurement control director, Republic Aviation Corp., Farmingdale, L. I., N. Y.

—o—

Lt. Col. H. Neely Henry has rejoined the industrial development department, Alabama Power Co., Birmingham, following service overseas as an artillery officer in the European theater.

—o—

Lynn Mahan has been appointed assistant to the president, in charge of public relations, American Locomotive Co., New York.

—o—

H. M. Jaquays, Montreal, vice president, has been elected president, Ontario Steel Products Co. Ltd.,Gananoque, Ont., succeeding the late **Dr. N. C. Jones. J. T. Richardson** has been elected vice president.

—o—

F. B. Millham has been appointed director, General Industrial Equipment Division, War Production Board, Washington, succeeding **William M. Haile,** who is returning to private industry.

—o—

L. O. Sweval, for the past two years, assistant to the president, Methods Engineering Council, Pittsburgh, has been named manager of the council's newly opened Eastern Division office, New York.

—o—

B. J. Brugge, welding engineer, has been named district manager of sales and service, of its recently opened sales office in St. Louis, Lincoln Electric Co., Cleveland.

—o—

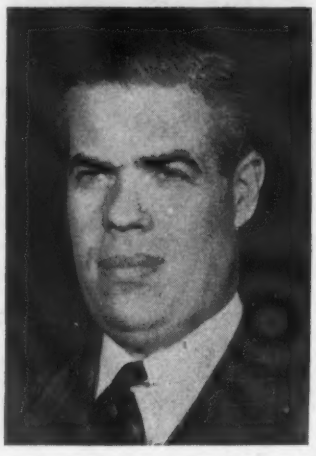
Arthur Smith Jr. has been named manager of the recently organized cathodic protection sales department, Dow

J. M. SYLVESTER

Who is general manager, Bethlehem, Pa., plant, Bethlehem Steel Co., as noted in STEEL, Aug. 27 issue, p. 88.

FRANK J. LASKEY

Now manager of purchases and raw materials, Republic Steel Corp., Cleveland, in STEEL, Sept. 3 issue, p. 104.



DAN A. FARRELL

Recently named supervisor of safety, Carnegie-Illinois Steel Corp., Pittsburgh, STEEL, July 30 issue, p. 66.

Chemical Co., Midland, Mich. Mr. Smith formerly was director of magnesium sales, southwest territory, with offices in St. Louis. **H. A. Ellis** will continue to handle magnesium sales in that territory. The cathodic protection sales department has representatives in New York, Chicago, Tulsa, Houston and San Francisco.

—o—

Dr. Eugene Lieber has joined the Nox-Rust Chemical Corp., Chicago. He formerly was with Standard Oil Co. of New Jersey where he was chemical director of the para-plant, Bayonne refinery, Bayonne, N. J.

—o—

Albert M. Harper, manager of specialty sales, Carnegie-Illinois Steel Corp., has retired at the age of 70, after 57 years of service with United States Steel Corp. **C. T. Siebert Jr.,** will succeed Mr. Harper.

T. F. Geraghty has been named general sales manager, Milwaukee Stamping Co., Milwaukee, succeeding **B. A. Otten,** retired. Mr. Geraghty has been with the company for 26 years.

—o—

James H. Rasmussen has resigned as general sales manager, Manufacturing Division, Crosley Corp., Cincinnati, to become a vice president, United Wall Paper Factories Inc., Chicago.

OBITUARIES . . .

Sir Allan Macdiarmid, 64, chairman and managing director, Stewarts & Lloyds Ltd., and president, British Iron & Steel Federation, died in London recently. He started his career with a Glasgow firm of accountants in 1898 and in 1900 he was appointed secretary, Stewarts & Lloyds company. He became a director of that company in 1918 and chairman and managing director in 1926. Mr. Macdiarmid was elected president of the British Iron & Steel Federation in March, 1944 and he was knighted in January of this year.

—o—

David Denton Hull, 73, president, Virginia Iron, Coal & Coke Co., Roanoke, Va., died recently at his home.

—o—

Thomas J. McLaughlin, 61, traffic manager, American Radiator Co. & Standard Sanitary Corp., New York, died Aug. 31 in Pittsburgh, in which city he made his home.

—o—

Edwin G. Fisher, 59, founder and president, National Steel Co., Chicago, died Sept. 1 in that city.

—o—

Robert B. Harper, 63, vice president in charge of research and testing, Peoples Gas Light & Coke Co., Chicago, died Aug. 29 in that city. Mr. Harper had been associated with the company since 1905. He was a trustee of Illinois Institute of Technology and served as its representative on the board of the Gas Institute of Technology.

—o—

William Watson Wells Jr., 62, president, W. W. Wells Ltd., Toronto, Ont., died recently. He had been engaged in the business, founded by his father, more than 40 years.

—o—

Mason Phelps, 60, president, Pheoll Mfg. Co., Chicago, died Sept. 2. Mr. Phelps founded the company in 1907 and had been associated with the company for the past 38 years.

—o—

Henry Disston, 71, chairman and former president, Henry Disston & Sons Inc., Tacony, Pa., died Aug. 29 in a hospital at Bar Harbor, Me. He became president in 1930, and retained that position until 1939, when he became chairman of the board.

—o—

Arthur M. Brewster, 65, for ten years sales engineer with Advance Pressure Castings Corp., Long Island City, N. Y., died Aug. 30 in Port Chester, N. Y.

—o—

Herman Cope, 64, sales manager, J. E. Rhoads & Sons, Philadelphia, died at his home in that city Aug. 30.

—o—

Hal B. Hayden, former treasurer, David J. Joseph Co., Cincinnati, died Aug. 26. Mr. Hayden served with the Joseph company 40 years and retired in 1940.

—o—

Harry W. Bails, purchasing agent for 33 years, Barber-Colman Co., Rockford, Ill., died recently.

—o—

John B. Patterson, 82, at one time sales manager at St. Louis and Atlanta, Midvale Steel Co., Philadelphia, died Aug. 27 in New York.

—o—

George A. Jacobs, 68, an engineer who was active in development of enameling wire for insulation, died recently at his home in San Marino, Calif. Mr. Jacobs had been associated with both the General Electric Co., Schenectady, N. Y., and Phelps-Dodge Corp., New York.

—o—

Frank A. Donaldson, 55, president and founder, Donaldson Co. Inc., St. Paul, died Aug. 26 at his home in Minneapolis.

—o—

Martin Heineke, 83, president, Heineke & Co., Springfield, Ill., and an inventor, died Aug. 29 in that city.

—o—

Harry M. Swigart, 53, president, Oilgear Co., Milwaukee, died recently at Star Lake, Wis. Mr. Swigart joined the organization, founded by his father, in 1923, served as vice president from 1924 to 1928 when he was elected president.

OPA's Reconversion Price Program

ANY RECONVERTING MANUFACTURER IS FREE TO SELL AT EXISTING CEILING PRICES. However, in any case where price adjustments are necessary to provide a prospect of good profits when production gets rolling, OPA WILL PROVIDE RECONVERTING MANUFACTURERS WITH NEW PRICES in one of the following ways:

I- INDUSTRY-WIDE ACTIONS

THIS IS THE BASIC PART OF OPA's RECONVERSION PRICE PROGRAM FOR RECONVERTING INDUSTRIES.

OPA CONSULTS WITH INDUSTRY:

① AT MEETINGS
② BY CORRESPONDENCE

} *NECESSARY PRICE ADJUSTMENTS ARE MADE IN THE FOLLOWING WAY:*

TAKE 1941 COSTS...	ADD ADJUSTMENTS FOR LEGAL INCREASES IN:		THEN ADD 1936-39 AVERAGE PERCENTAGE MARGIN OF PROFIT ON COSTS	THIS GIVES THE NEW CEILING PRICE (1941 Price was $97.00)	IN THIS EXAMPLE, THIS WORKS OUT TO AN "INCREASE FACTOR" OF 11.1%	ANY FIRM IN THIS INDUSTRY CAN INCREASE ITS 1941 PRICE BY THIS PERCENTAGE (11.1%)
	MATERIALS AND PARTS PRICES	BASIC WAGE RATES SCHEDULES				
			8% of $101.00			
$90.00	$4.00	$7.00	$8.08	$109.08	11.1%	

INDIVIDUAL FIRMS THAT NEED BIGGER ADJUSTMENTS MAY APPLY FOR THEM UNDER THE INDIVIDUAL-FIRM ADJUSTMENT PROVISIONS AT THEIR OPA DISTRICT OFFICES.

II- INDIVIDUAL-FIRM ADJUSTMENT PROVISIONS

There are three circumstances under which a particular reconverting firm may apply for necessary individual adjustments.

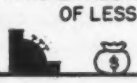
① A firm that needs bigger adjustments than the industry-wide price increase factor allows.

② A firm returning to civilian production before its industry requests and receives an industry-wide price increase factor.

③ A firm in an industry which will not have an industry-wide price increase factor because the industry as a whole never converted to war production.

HOW FIRMS OF VARIOUS SIZES FIGURE THEIR INDIVIDUAL PRICE ADJUSTMENTS

FIRMS EXPECTING GROSS ANNUAL SALES OF LESS THAN $50,000



① TAKE TOTAL CURRENT PRODUCTION COSTS . . .

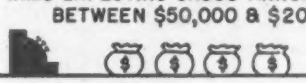
② ADD OWN PROFIT MARGIN FOR FIRST OF FOLLOWING YEARS— 1939, 1940, OR 1941 — FOR WHICH FIRM HAS FIGURES

OR

OPA'S INDIVIDUAL ADJUSTMENT PROFIT FACTOR * . . .

***RESULT*—NEW CEILING PRICE**

FIRMS EXPECTING GROSS ANNUAL SALES BETWEEN $50,000 & $200,000



① ADJUST OWN 1941 COSTS FOR

A. INCREASES IN OWN STRAIGHT-TIME FACTORY LABOR RATES . . .

B. LEGAL INCREASES IN OWN MATERIALS AND PARTS PRICES . . .

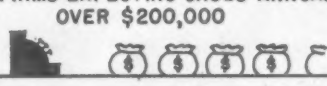
② ADD OWN 1936-39 PROFIT MARGIN . . .

OR

OPA'S INDIVIDUAL ADJUSTMENT PROFIT FACTOR * . . .

***RESULT*—NEW CEILING PRICE**

FIRMS EXPECTING GROSS ANNUAL SALES OVER $200,000



① ADJUST OWN 1941 COSTS FOR

A. INCREASES IN OWN BASIC WAGE RATES SCHEDULES . . .

B. GENERAL LEGAL INCREASES IN OWN MATERIALS AND PARTS PRICES . . .

② IF THESE ADJUSTED COSTS ARE HIGHER THAN EXISTING CEILING, ADD OPA'S INDIVIDUAL ADJUSTMENT PROFIT FACTOR * . . .

***RESULT*—NEW CEILING PRICE**

*Individual adjustment profit factors will be provided by OPA District Offices along with application forms.

WING TIPS

Aircraft industry is designing in terms of function as it plans the airplanes of tomorrow. New developments will make great commercial air fleets possible and will make present military air forces obsolete in five years

By I. M. LADDON*

WHEN the Wright brothers flew the first powered airplane a little more than 41 years ago, they got off the ground in what was appropriately called a flying machine. That was all it was—a machine that flew. From that small beginning, the airplane has developed into a mode of transportation. Everything done since then in the way of engineering and operations has been aimed at just one primary objective: To make the flying machine a more efficient, and therefore more economical, means of transport.

Economical transportation is the result of a balance between load, speed and cost. What is happening to the design of the commercial airplane is comparable to what happened to the automobile. For instance, the race cars at Indianapolis have just one job: To circle a 2½-mile brick track at high speed. Load carrying ability is not important. Neither is the cost of the operation. If a driver can get a car speedier than any other car on the track, he has achieved economical transportation in terms of auto racing, for he comes in first and wins anywhere from 35 to 40 thousand dollars. But if that same driver then decided to take a contract for hauling bricks with his racing car, he could not deliver economical transportation in terms of commercial trucking.

What automobile manufacturers have done with the motor car, we have begun to do with the airplane. We are designing in terms of function. We are rapidly making present models obsolete. Military aircraft are already demonstrating the great diversification the airplane of the future will amplify. Here again we are faced with the question of building not a cheap plane, but one economical in the fullest military sense.

Obsolescence Comes Fast

Since no one can measure the cost of losing a war, the military simply asks the aircraft industry to produce a better plane for each special purpose than any other nation is flying; and to produce it in equal, or greater, numbers. As the war has progressed we have seen certain ships specially designed for dive bombing, other ships for low level bombing, still other planes for high level bombing. Fighters also have become specialized. In the maelstrom of actual combat, all these planes have performed other types of work. But primarily each military plane is designed today for a specific job, and gives maximum performance on that job. When it comes to obsolescence, the military plane is even more subject to competitive deterioration than are commercial models.

From the standpoint of design engineering, the form of the airplane has been reasonably well stabilized for the past ten years, except as it has been marred by military requirements. In design, we have dealt with four elements: A fuselage, a wing, an empennage or tail, and a power plant. We have improved the design of each; we have improved the interaction of each with the others or decreased and minimized their mutual interference. But we have not discarded any of these on a practical basis.

True, experimental "flying wings" have been built and flown—planes that discarded the tail—and they have achieved a measure of stability. But the cost has been high. Part of the price paid is in the necessity more or less to freeze the center of gravity. In the "flying wing" you cannot carry a mobile load. For either cargo carrying or passenger transport, this is a serious handicap.

The B-24 Liberator, for instance, is reasonably stable—that is, it can be flown and controlled within a range of 20 per cent of the average wing chord. This means that you can shift your load around somewhat, if you are carrying cargo, and still handle your plane. Or, if you have passengers, they can make necessary trips aft occasionally without causing the pilot serious trouble. But in a "flying wing" everything has to stay put. Small boys, for instance, would be a difficult problem in a "flying wing."

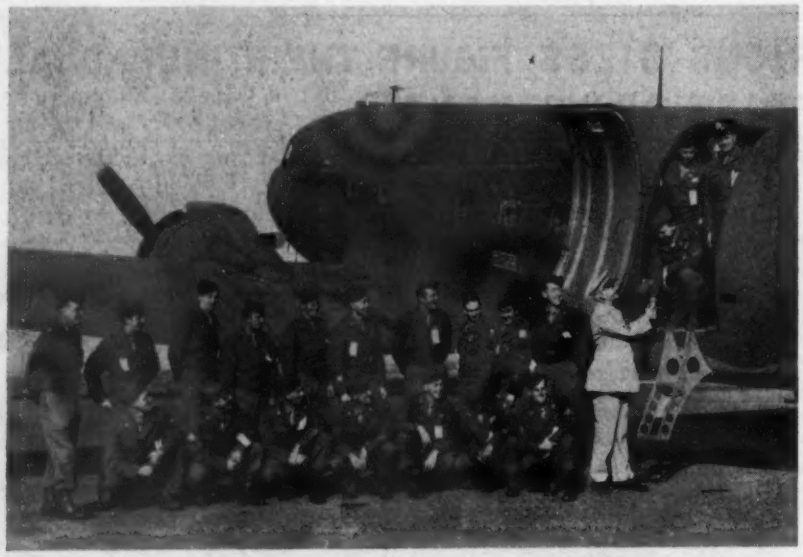
Two-Element Machine Design

There remains another fundamental about an airplane to remember. We think of an airplane, for instance, as an air machine. That is only partly true. The airplane is also a land or a water machine. During takeoffs and landings the airplane is earthbound. An airplane then is really a two-element machine—ground and air.

This matter has an important bearing on design. Primarily we design a plane for optimum performance in the air. But we also have to put on landing gears, and design airfoils and flaps. Flaps are used on landings and takeoffs to augment lift and increase drag. Then, when we are airborne, they are retracted to reduce drag and increase cruising speed. By means of wing flaps, and various other means of temporarily changing the airfoil, we are able to satisfy both the earthbound and the airborne requirements of design.

To these requirements "something new" is about to be added. We may soon have to redesign airplanes in terms of "sonic and supersonic" speeds. This is where the trouble starts. For no one, not even among today's aeronautical re-

*Excerpted from *Plane Talk*, August, 1945. The author is executive vice president, Consolidated Vultee Aircraft Corp.



PLANES REDEPLOY VETERANS: Initiating an airborne transportation program to carry thousands of soldiers across the country to Army camps for processing, the Army hopes to relieve rail congestion as well as speed the processing. Photo shows first group of soldiers leaving Newark, N. J. NEA photo

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SPEED NUTS are truly the answer to an engineer's prayers because they do more than just hold parts together! Their versatility makes it possible to "button-up" any assembly better and faster—eliminating costly design compromises and secondary operations often necessary with ordinary fasteners.

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Chances are, you'll be able to find the RIGHT fasteners among more than 3000 shapes and sizes in the SPEED NUT line. If not, we can come up with new ones specially designed for your particular needs. In either case, SPEED NUTS will improve your post-war products and reduce your net assembly costs. Send in your fastening specifications for analysis . . . TODAY!

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search engineers, knows for sure what happens when an airplane gets into the speed ranges known as "sonic" and "supersonic." All we know certainly at this time is that when an airplane gets into the sonic speed ranges it may take a physical beating for a number of technical reasons. We think that if it could pass into the supersonic speed range, conditions of reasonably stabilized flow again would prevail.

We should not have to worry much about these high speeds except for one factor. After being powered by a reciprocating engine for its entire life span of slightly over 41 years, coasting more or less comfortably along all this time at subsonic speeds, the airplane has suddenly acquired a new type of power plant. This is the gas turbine driving a propeller; or the gas turbine operating as a jet propulsion unit. With this new type of motive power we can attain much higher speeds economically than with the reciprocating engine. These speeds offer new problems of aeronautical design. It is likely the wings on the new airplanes will be much thinner, and will have sharper leading edges than wings of today's planes.

When an airplane approaches sonic speed—so-called because it is the speed of sound—strange new problems arise. While the airplane is flying at today's ordinary speeds, the air flows over and under the wing, around the fuselage and tail, and around the tips of the wing. The flow in general is fairly smooth. If you will think of a boat displacing water at moderate speeds and creating bow waves and stern waves, you will have an analogous picture. The airplane creates many similar waves as it parts the air.

Now as long as we fly at subsonic speeds this parting and flowing of the air around the aircraft proceeds on a fairly even basis. But when we begin to approach the sonic speeds we meet a new phenomenon. Instead of the air parting and flowing around the wing some of it piles up. You can at least think of it as piling up out in front, being pushed along.

For those who have had experience with boats, it may be helpful to translate what happens to the airplane approaching sonic speeds into what happens to a displacement boat in the water at relatively slow speeds. This piling up action of the water at the bow of a displacement boat begins at low speeds, and becomes substantial at speeds from 25 to 40 miles an hour, depending upon the lines of the hull. In hydrodynamic terms this is called the hump. The drag, which starts out by rising gradually, suddenly increases radically as we increase speed. To get only a little more speed, we have to pour in a much larger amount of power.

"Drag" Builds Up Rapidly

What is happening is this: The faster we go, the larger the wall of water we are pushing ahead of us and the greater the drag.

Now in flying boats when we reach the point in our take-off where the drag on the hull is building up fast, we gun the engines and rock the controls a little. By doing this we break through the hump and begin to plane.

We do not know to what degree this analogy holds so far as air is concerned, but we do believe there is some similarity. The early effect is the same in each case—an accelerating increase in drag that appears to extend into infinity. In the air, from zero miles an hour to speeds below the sonic range, the increase in the drag has gone up on a smooth easy slant. But when we approach the sonic speeds, that slant suddenly goes up in a sharp curve. The effect, when flying a plane, is described as being like that of hitting a brick wall.

No one has yet taken an airplane through this sonic speed range, which is called the "area of compressibility." But we have fired rockets and projectiles that have gone through it and into supersonic speed ranges. A rifle bullet and the V-2 rocket bombs, for instance, both travel at speeds much higher than that of sound.

How we are going to get an airplane through that sonic speed wall and into the supersonic speed ranges, where conditions will get back to a predictable normal, is something we have not solved yet. We are making experiments in wind tunnels, but for technical reasons they are not entirely satisfactory. It is possible we shall do our first experimental flying in the sonic speed ranges with pilotless radio controlled planes that will register their instrument findings on the ground.

All of this deserves mention for a most important reason. It shows that progress in the design and production of aircraft is not ending, but just beginning. We have a practically new industry on our hands today. The excitement of pioneering, the satisfaction of helping to find the answers to new problems, has returned.

The gas turbine engine which is forcing designs for supersonic speeds upon us heralds other changes, too. For one thing, we are going to have much less vibration in gas turbine airplanes than we have with today's reciprocating engine airplane. That not only means more comfort for the passengers, it also means we can cut down the weight of airframes and increase payloads.

PANAMA'S FUTURE AIRPORT: Main entrance to proposed Panama national airport administration building, showing passenger ramp to upper deck. F. H. McGraw & Co. of Panama designed this new airport, which will cost approximately $7 million. The two-story reinforced concrete terminal building is 625 feet long and contains approximately 300,000 square feet of space. It will be air conditioned

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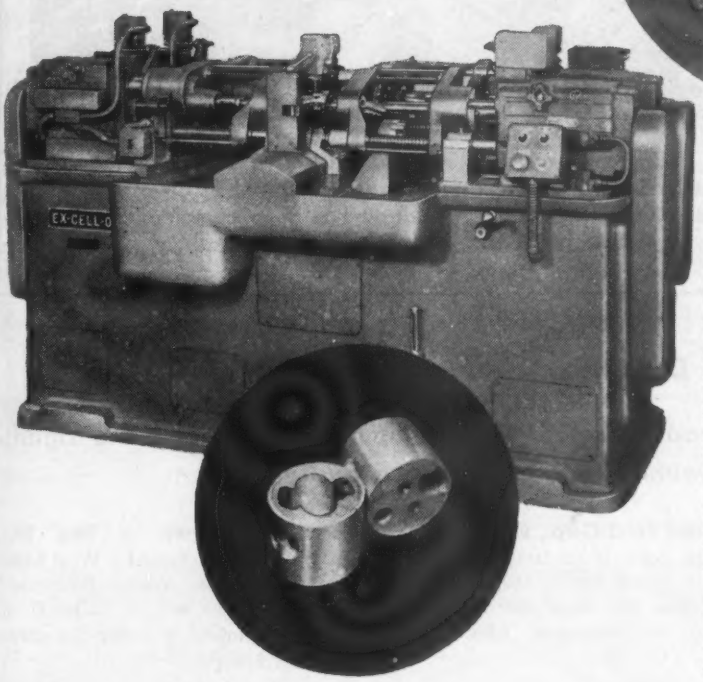
HOW EX-CELL-O HYDRAULIC POWER UNITS CAN FIT INTO YOUR PRODUCTION PROGRAM



Above: Ex-Cell-O Hydraulic Power Unit Style 28-A.

●

To left: **Ex-Cell-O Small Style No. 21 Hydraulic Units being used for accurately drilling holes in oil pump bodies. This small unit makes for less floor space. It has all the features of the larger units and can be operated individually or in combination.**

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Ex-Cell-O Hydraulic Power Units are standard and produced in quantities, but in nearly every case where the unit is used it becomes a part of a special, high production type machine for a specific operation. These units are economical because, as applications change, the units can become a part of the new machine even though entire base is redesigned . . . The units can be mounted on any plane—horizontally, vertically, or angularly—on a temporary or a permanent base, and they can be arranged so that it is possible to use them in connection with guide bars and multiple drill heads . . . Find out today how Ex-Cell-O Special Machines and Ex-Cell-O Hydraulic Power Units can fit your program for today's and tomorrow's production. Write Ex-Cell-O today.

Standard and Special Multiple Way-Type Precision Boring Machines

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Multiple Drilling and other Special Purpose Machines

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Precision Thread Grinding Machines

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Broaches and Broach Sharpening Machines

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Continental Cutting Tools

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Tool Grinders

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Hydraulic Power Units

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Grinding Spindles

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Drill Jig Bushings

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Fuel Injection Equipment

•

[illegible] Pins and Bushings

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Pure-Pak Paper Milk Bottle Machines

•

Aircraft and Miscellaneous Production Parts

45-27

EX-CELL-O CORPORATION
DETROIT 6, MICHIGAN

Steel Company Has $5 Million Expansion Plan

Allegheny Ludlum announces work will be started soon on new research laboratory and cold rolling mill

A $5 MILLION research and production expansion program has been approved by the directors of Allegheny Ludlum Steel Corp., Brackenridge, Pa., Hiland G. Batcheller, president, announced last week.

An ultra-modern research laboratory and related experimental and pilot plant equipment will be built at company headquarters at Brackenridge to intensify studies of the structure, melting, processing and further development of high alloy steels.

At the West Leechburg, Pa., plant will be constructed a cold rolling mill of latest design, for rolling stainless and silicon strip steels. It will add materially to the capacity of the plant and will bring new precision and uniformity of quality in the production of the special strip steels made there.

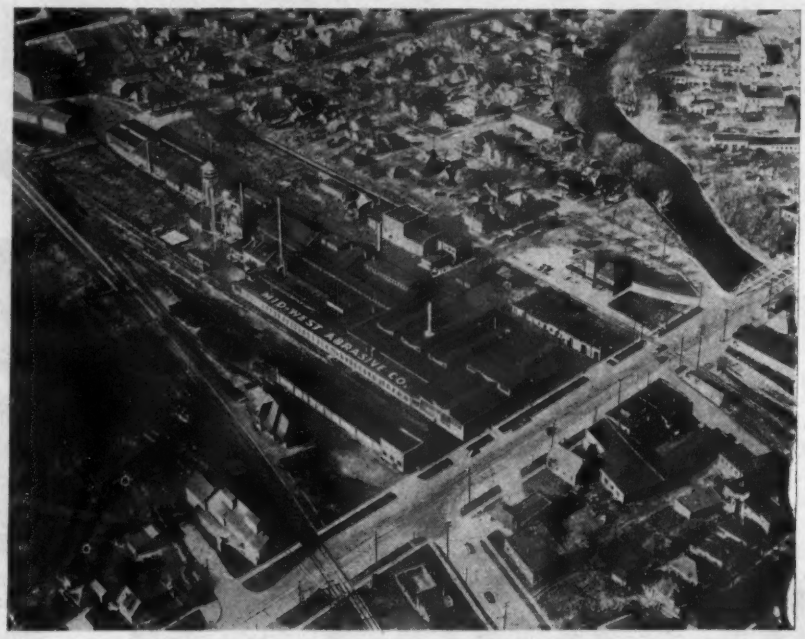
"Work on these projects will get underway rapidly," said Mr. Batcheller, "and will provide additional employment for both communities. The joint research and production expansion program will enable the company to meet the needs of its postwar markets, with more and better alloy steels.

"As the manufacturer of complex special steels, Allegheny Ludlum always has considered itself challenged to serve the most advanced needs of modern industrial technology, at each new upward level of progress. By this program, we are marking our acceptance of the postwar challenge," Mr. Batcheller said.

Expansion Plans Evidenced By Chicago Area Spending

Land purchases for later construction of new plants has marked recent industrial development activity in the Chicago area. In addition, many existing plants have announced expansion programs, and several new concerns are planning to enter the area.

Total values represented in construction and land purchases during August amounted to $7,373,026, according to the industrial department of the Chicago Association of Commerce. Addition of August figures brings industrial development spending for the first eight months of this year to a total of $99,431,141.



MIDWEST ABRASIVE'S PLANT: Central executive offices of the Mid-West Abrasive Co. have been established at its plant in Owosso, Mich., and transfer of headquarters from Detroit has been completed. Above are shown plant and offices at Owosso

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Bates Expanded Steel Corp., East Chicago, Ind., has been purchased by E. S. Christiansen, president, Aluminum Alloyers of America Inc., Magnesium Co. of America Inc., and owner of Edw. S. Christiansen Co., Chicago.

—o—

Douglas T. Sterling Co., Stamford, Conn., has completed a survey of incentive wage plans now in use, and a booklet summary of the survey is available upon request.

—o—

Philco Corp., Philadelphia, developed 48 different radar systems for the Army and Navy during the war, and the company's production of radar equipment totaled over $250 million.

—o—

Cooper-Bessemer Corp., Mt. Vernon, O., has announced that one of its turbocharged gas-diesel engines has set a new record in engine thermal efficiency for internal combustion or heat engines, with a thermal efficiency of over 40 per cent.

—o—

Pittsburgh Plate Glass Co., Pittsburgh, has prepared a new series of booklets explaining the use of color to control mental and physical reactions of employees and clients for better production or more satisfactory business relations.

Robert Hetherington & Son Inc., Sharon Hill, Pa., has opened a West Coast office at 5607 West Adams Boulevard, Los Angeles. Sales will be under C. E. Fisher, and engineering under the direction of L. E. Massie.

—o—

Hewitt Rubber Corp., Buffalo, has acquired a controlling interest in Robins Conveyors Inc., Passaic, N. J., purchasing approximately 90 per cent of the Robins stock.

—o—

Briggs & Stratton Corp., Milwaukee, has agreed with the War Contracts Price Adjustment Board to refund $2,866,473, less credit for federal income tax and excess profits taxes, to the government.

—o—

Remington Rand Inc., Buffalo, has moved its Systems Division from Buffalo to the Remington Rand building, 315 Fourth Avenue, New York 10.

—o—

A. P. Green Fire Brick Co., Mexico, Mo., has moved its advertising and public relations department from its general offices and plant in Mexico, Mo., to offices in the Railway Exchange building, St. Louis.

—o—

Westinghouse Electric Corp., Appli-

ance Division, Mansfield, O., is planning to market a new fully automatic dishwasher, designed to be available to the average home, and an electric sink-attached unit which grinds up kitchen wastes and flushes them down the drain.

—o—

Clark Equipment Co., Buchanan, Mich., has printed a pocket-size booklet containing the complete text of the United Nations charter. The booklet is available to businessmen upon request.

—o—

Edison General Electric (Hotpoint) Appliance Co. Inc., Chicago, is making electric water heaters for the first time since early 1942, with first output slated for emergency U. S. Navy housing in the Hawaiian Islands.

—o—

Crosley Corp., Cincinnati, is planning to produce 1,400,000 home radio receivers and 450,000 electric refrigerators in its first full year of peacetime production.

—o—

Greaves Machine Tool Co. and Cincinnati Yacht Supply Co., Cincinnati, have been purchased by Walter E. and Joseph J. Schott. The firms, whose products include gears and machine tools, will continue under management of the former owners, William A., George B. and William H. Greaves.

—o—

Aro Equipment Co., Bryan, O., has appointed nine new jobbers to handle Aro industrial pneumatic tools as follows: Genesee Supply Co. Inc., Utica, N. Y; Stellhorn Co., Toledo, O.; Cleveland Tool & Supply Co., Cleveland; J. Ernest Stroud & Co., Amarillo, Tex.; Russ Chamberlin Co., Portland, Oreg.; Industrial Engineering Equipment Co., Davenport, Iowa; Electrical Appliance & Equipment Co., Wilmington, N. C., and Electric Home Headquarters, Minneapolis.

—o—

United States Bureau of Mines is expected to contract immediately for engineering surveys of the Coosa, Ala., coal fields, Congress having appropriated $100,000 for exploration of the fields, which state geological surveys several years ago indicated possessed rich coal deposits.

—o—

Philco Corp., Philadelphia, last week started assembly line production of refrigerators, and President John Ballantyne expects prewar production volume in six or eight weeks.

—o—

Eversharp Inc., Chicago, is planning to employ 1000 additional workers in a new plant within 100 miles of New York city, for production of a new ball-bearing writing instrument.

—o—

Nox-Rust Corp., Chicago, has changed its name to Nox-Rust Chemical Corp.

—o—

Marmon-Herrington Co., Indianapolis, is entering the transit equipment industry with a line of trolley coaches.

—o—

Trane Co., La Crosse, Wis., is planning an expansion program more than doubling present facilities.

SEEKING POSTWAR NEEDS: Sir Oliver Simmonds, right, a member of the British Parliament and head of Simmonds Accessories Ltd., is shown conversing with George Tinnerman, Tinnerman Products Inc., Cleveland. Sir Oliver told Mr. Tinnerman that England will look to America for many of its postwar needs, predicted England's postwar housing program will be the greatest construction program ever undertaken by peacetime England

Help Offered On Problems of Reconversion

Chicago Association of Commerce has program to assist businessmen in shifting to peacetime operations

WAR PROBLEMS service department of the Chicago Association of Commerce, formed in 1941 to keep Chicago businessmen abreast of governmental regulations affecting their affairs and aware of the war problems which would affect their postwar programs, has been converted into a reconversion problems department.

It has conducted more than 225 war problems school sessions, hundreds of smaller group meetings and many thousands of individual conferences. These were supplemented by bulletins, books and other publications.

In coming months when Chicago business is shifting to peacetime operation, the reconversion problems department will carry on a program to keep businessmen informed of the latest developments affecting contract termination, reconversion pricing, disposal of war surplus goods, dismantling of the structure of War Production Board regulations, employer problems in re-employing veterans, and wage and other economic government controls.

The association's wartime educational program won national recognition and brought from the Sixth Service Command of the U. S. Army a citation for distinguished service, the only such citation given to a similar civic or business group.

Foreign Trade Lists To Be Revised by Commerce Dept.

The Department of Commerce plans complete revision of its trade lists of foreign firms that bought American goods before the war. To do this, the department will form a division dealing with changes that occurred during the war. A preliminary study of the changes in trade channels has indicated that thorough revision of the lists is needed.

The file of trade lists maintained by the department, now to be brought up to date, records the names and addresses of potential purchasers of American-made merchandise, as well as the sources of essential materials for import into this country in approximately 100 principal foreign areas. European countries in which trade data have been greatly affected will be given first consideration in the revision of the lists.

ELECTROLYTIC P

This summary of the current status of the electropolishing process shows why some producers of consumer articles may find it a tool for new finishing effects and possible economies

THERE is no real reason from the technical standpoint, why every common metal used in industry may not lend itself to electropolishing. Electropolishing is an established commercial process and is solving a variety of production problems. The ultimate place for electropolishing in industrial finishing operations will probably depend, as would be expected, upon the costs relative to mechanical methods as considered in each particular application.

Like any new development the early history of electropolishing was filled with some misunderstanding and, oftentimes, too much wishful thinking; there was frequently a lack of understanding and recognition of its shortcomings. It is not the cure-all that some have claimed. There are in industry certain applications where grit finishing cannot compete with electropolishing; conversely, there are other operations where electropolishing cannot compete with mechanical methods. In between these limits are found applications where electropolishing and mechanical polishing overlap, supplementing or complementing each other.

Electropolishing processes are now available for and in use on a commercial scale in production. The process is no longer simply a laboratory tool, as was the case a few years ago, for use by metallurgists in preparing samples for metallographic examination, where the first important applications were found. Interesting future possibilities are opening up, particularly for stainless steel, nickel, copper, brass, monel and aluminum, as well as plated metals which also can be electropolished. Although there are general conditions which relate quite widely to the process of electropolishing there is still an element of having a solution more or less tailormade to fit the particular application.

John S. Crout of Battelle Memorial Institute, which institution has done considerable work in the development of commercial electropolishing processes, states that each application of electropolishing requires individual study and each installation must be custom-built. Furthermore, conditions which make the process technically and economically desirable in one plant make it entirely unacceptable in others.

Finishing for Appearance

The most obvious application for electropolishing and the one most frequently thought of today, is finishing for appearance where brilliance and color tone can be achieved to exceed what is possible by mechanical means, such as by wheel polishing and buffing or by tumbling. Electropolishing offers a new method for imparting a "finished" or a "quality" appearance to classes of work previously left unfinished because of shape factor or extreme macro-roughness. There is no other way at present by which articles of complex shape or as-cast and as-sandblasted surfaces can be given a very brilliant finish without extensive work. An example of the above possibilities opened up by electropolishing is found in the case of stainless steel castings and for intricate formed objects less accessible, if at all, to wheel work.

A sandblasted finish, which is normally a dead, gray tone, can be dressed up to a brilliant new type appearance that literally sparkles. Stainless steel castings can be brightened readily by electropolishing because the solution gets into the base of the pits, cleans them out and produces a bright surface. As-cast they have a dull, unattractive appearance and cannot be brightened by any mechanical means which will reach down in the pits and brighten the entire surface. As a result, electropolished stainless steel castings have an unusual luster, even in the rough state, which makes them more attractive than unpolished castings and thereby enhances their sales value.

Many combinations of two-tone and relief effects are possible and quite practical to produce. Lacquers are used to "stop-off" areas or sections that are not to be anodically attacked. Use of these also permits etched designs to be produced that are polished on the areas attacked. The raised areas either can be polished or left natural as desired. Fig. 2 shows a unique two-tone decorative effect obtained on stainless steel by "stopping-off" prior to electrolytic polishing[3].

Designers and finishers may be influenced by the fact that heretofore any mirror-bright surface has been a wheel-buffed or cold-work surface. Thereby, automatically, the planeness of a wheel-buffed surface has been associated with great brilliance. Design and finishing requiring brilliant surfaces had to take into account the mechanical polishing that was previously the only way to achieve the result. By electropolishing, unique, bright frosty, to mirror brilliance can be obtained.

The rating of decorative finishes is, in general, not subject to quantitative evaluation, but is more a matter of personal opinion with people having the duty of passing on sales appeal. According to recent reports[3], such authorities have given high approval to electropolished finishes on those products on which final finish is of utmost importance —in such articles as ironers, toasters, percolators, domestic equipment, and costume jewelry. Final finishes are important on products such as these which are viewed at close range and where minor defects become prominent. Electropolished finishes have a superior

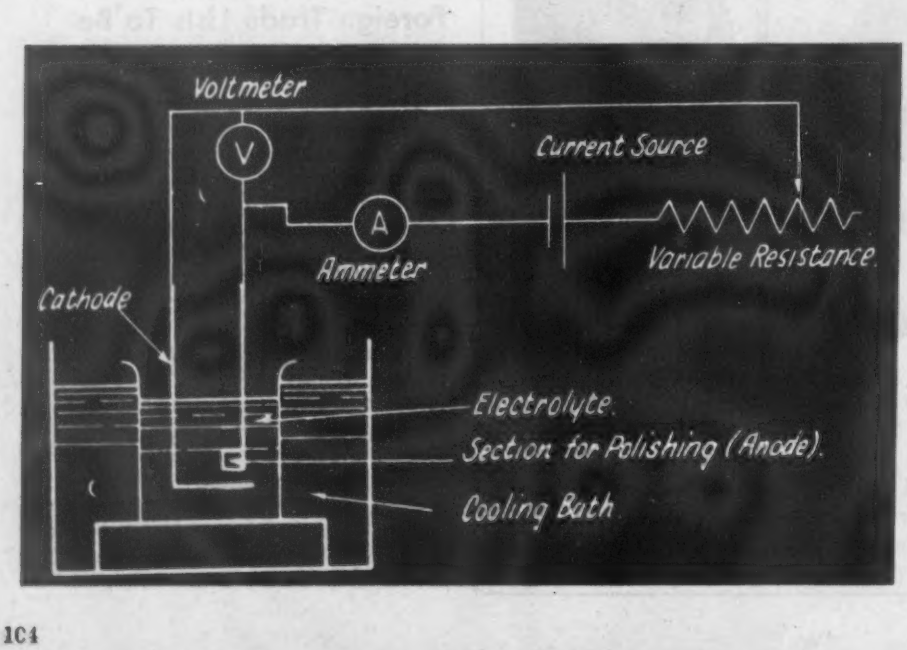


Fig. 1 (left)—Typical circuit for electropolishing

C POLISHING

color rating resulting from a complete absence of wheel marks.

According to Faust[2], there is some question whether electropolished surfaces have improved tarnish or corrosion resistance. In some atmospheres electropolished stainless steel is more corrosion resistant than wheel polished and nitric passivated. This effect is attributed to a heavier, denser, more resistant or more uniformly covering film.

In addition to its utility for metal finishing, electropolishing offers interesting and practical applications in machining metal where appearance is not of primary concern but where uniform metal removal is. Faust[2] gives an example of one installation in which several thousand parts are electropolished by two operators in a single shift to simply and uniformly remove 0.005-in. of metal. The same production formerly required three men, three shifts on machines. There are many instances where sawing, grinding, and stamping burrs, etc., are more economically removed by electropolishing. Since burrs are at the edges, they are at the location of most rapid metal removal during electropolishing. Burrs with poor accessibility for mechanical removal can thus be more easily removed.

Benefits of Electropolishing

The benefits of electropolishing prior to heavy electroplating have been stressed by Faust, particularly with iron, nickel, or chromium[2]. These benefits are due to the fact metal is removed without accompanying mechanical work, which introduces heat effects, strains, tearing and deranging of the crystal structure of surface layers. As a result, the electropolishing surface (1) is as free from strains as the original metal; (2) has a structure that is characteristic of the body of the metal; (3) is free from metal fragments and layers of broken-down crystal structure; and (4) is not influenced by heating effects from mechanically working the metal. All of these factors are of great interest where the bond zone is subjected to high stresses during functional use of a part having a heavy electroplate.

In early work by Blum[8] it was shown that in those cases where the crystals of the electrodeposit represent a continuation of the crystals of the base metal, almost perfect adhesion is obtained. Thus, after electropolishing, the base metal presents its true crystal structure to the depositing metal in the subsequent plating process. The plated metal then can continue the crystals of the base metal as well as the relative crystal habits of the two metals will permit. A metal-to-metal bond is realized in which the atomic forces provide the adhesion. Better bond strength than that which results cannot be obtained.

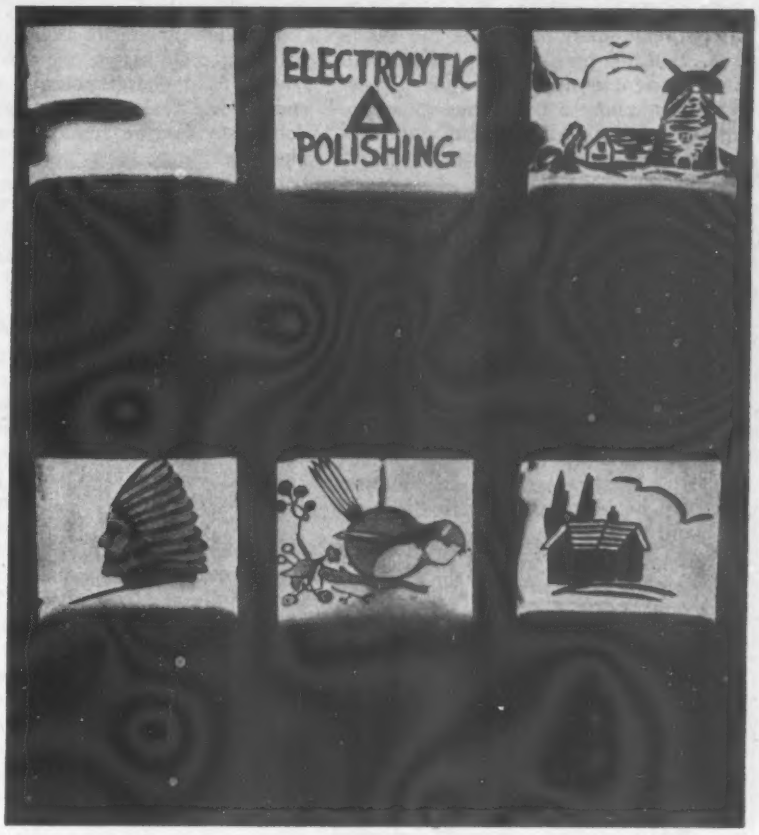


Fig. 2 (above)—Two-tone decorative effect on stainless steel obtained by use of stop-off lacquer prior to polishing.—From "Sheet Metal Industries"

After many of the common surfacing operations such as machining and grinding, the strength of the surface layer of steel or other metal can be appreciably less than that of iron, nickel, or chromium plate. For instance Faust[2] cites the example that tensile specimens by the Ollard method[9] for heavy nickel plate or machined SAE-1010 steel broke at only 35,000 psi for the steel having a strength of 100,000 psi and nickel plate of 90,000 psi. Thus it would appear that the bond of nickel plate to steel failed at 35,000 psi.

Removal of this layer by electropolishing or mild mechanical polishing (as used by metallographers) and then nickel plating, provided bonds of such strength that failure in tension came at 90,000 psi entirely in the nickel plate. Thus, as perfect a bond as could be expected was obtained. However, it should be pointed out that there are mechanical methods for surfacing metals without the introduction of excessively weak metal layers, such as honing, or other light abrasive finishing; however, these are not always applicable to a surface of irregular shape. In such cases electropolishing does the job.

Faust[2] points out that machining, deburring and polishing can be accomplished in one operation and predicts wide commercial use. The term *"mechanical cleanliness"*, meaning the absence of layers of mechanically damaged or strained metal, is used to describe the surface condition of the metal. This term probably will stand beside *"chemical cleanliness"*, referring to freedom from oxides and scale, and *"physical cleanliness"*, meaning freedom from oils, greases and dirt.

Another application of electropolishing before plating that has been pointed out[2], and which probably comes under the heading of appearance involves the electropolishing of base metal, then bright plating, electrobuffing the plate and using as it comes out, or following with chromium plate. Electrobuffing of plated metals is thought to be entirely practical and generally involves removal of no more than 0.0002-in. of metal to achieve full color.

Processes

There are several different electropolishing processes, including such solutions as mixtures of perchloric and acetic acids; sulphuric and citric acids based on process and patents held by the Rustless Iron and Steel Corp[7].; phosphoric acid and glycerine as proposed in work by Uhlig[6]; and phosphoric and sulphuric acid developed by Pray and Faust and associates and covered by patents owned by Battelle Development Corp.[1].

In general, the operating conditions used in electropolishing processes are comparable to those used in chromium

plating. The article to be polished is racked individually and made the anode in a bath of proper composition, and direct current is applied in such a way as to bring about a de-plating operation. Fig. 1 shows a typical circuit for electrolytic polishing.

Reverse of Electroplating

Electropolishing is usually thought of as the reverse of electroplating. In electroplating the work is made the cathode and metal is added; while in electropolishing the work is made the anode and metal is removed. The amount of metal removed in an electropolishing operation depends upon the time of immersion, the current density used and to some extent on the condition of the surface. Most all grades of stainless steel can be electropolished by removal of about 0.0005-in. of metal.

Current densities used in the Battelle sulfuric-phosphoric process are described by Crout[1] to range from 100 to 500 amp per sq ft, with 200 to 250 as a general average. Temperatures are given as varying from 115 to 250° F, with most operations conducted between 125 and 140° F. The voltages are between 2 and 18, with most applications using 6 to 8 v. Time of treatment may be from 1 to 40 min., with the majority of products requiring only 10 to 20 min.

Stainless Steels

A considerable amount of work has been carried out in investigating the possibilities of electropolishing stainless steels. There is obviously a big field here due to the increasing popularity of this material in manufacture of many types of articles. While stainless steel provides varying degrees of corrosion resistance depending to an extent on its constituents, the possibilities that exist for its decoration are strictly limited. Most generally the decoration takes the form of applying as high a polish to the surface as can be obtained by using the available polishing methods. As a rule, most stainless steels are relatively tough and because of this, do not lend themselves to easy polishing by mechanical methods. The polishing operation, as a result, is relatively expensive both in material and labor and hence any other method of obtaining a similar finish which is more economical holds obvious attractions. Electropolishing processes offer a means of expanding the usefulness and lowering the costs of fabricating stainless steels.

The degree of smoothness resulting from the electropolishing of stainless steels depends to some extent on the smoothness of the original surface. An important question then which naturally arises is: At what point and to what extent is mechanical polishing a useful asset as an aid to electrolytic polishing? To obtain the best possible results, some initial mechanical polishing treatment is desirable. The amount of mechanical work that is required varies greatly, and is largely dependent on the type of article and the economics involved.

The direct elements of cost of electropolishing include the chemical solution, power, fixed charges on the equipment and labor. No generalizations on solution costs can be made because some electropolishing baths have finite lives dependent upon saturating the bath with metal, which is fixed on the amount of metal removed from the products treated, whereas other baths have practically infinite lives, losses depending on drag-out.

A major item of cost in electropolishing is labor. This may vary greatly depending on the product being polished and whether complicated racking procedures employing highly skilled labor are required. Crout[1] of Battelle Memorial Institute has reported costs per square foot of area polished to vary between 2 and 90 cents which have proved profitable in both cases. Faust[2] cites that where one electropolishing installation operates successfully at a cost of 2 to 5 cents per square foot of surface, another is entirely practical at $1 per square foot processed. However, it is generally agreed that the most advantageous overall costs are secured when electropolishing can be used to replace several operations such as descaling, deburring, tumbling and wheel polishing.

Electropolishing costs per unit even then may be high, but the overall savings make the process attractive. Electropolishing often permits streamlining of finishing steps preceding and following the operation. A realization of the true value of electropolishing apparently can result only from a complete analysis of each application.

Possibilities

At this time, when reconversion to civilian production is under way, designers, engineers and metal finishers undoubtedly will explore the possibilities of electropolishing in their finishing problems. It may be found that an entirely new tool is available for achieving new effects and new economics in manufacturing operations.

Electropolishing is a new process and sufficient experience has not been gained to reveal all of its advantages or all of its applications as a commercial process. In developing new uses for electropolishing, Crout[1] reports that at Battelle Memorial Institute the following list of products from a number of different companies have been studied: Automobile bumpers, hub caps, radiator caps, horn buttons, windshield wipers, insignia, gears, hardware and dash panels; watch springs, pivots, cases, and gears; refrigerator hardware, trays and shelves; surgical and dental instruments; aircraft and automobile engine spark plugs, piston rings, and valves; cutlery, tableware, vacuum bottles, electric irons, waffle irons, toasters, and various kitchen utensils; saws, files, drills, reamers, bits, wrenches, pliers, cutters, and similar tools; a variety of aircraft parts; metal milk containers; tubing; wire; needles; household and cabinet hardware; costume jewelry, watch bracelets, belt buckles and luggage hardware; telephone parts; dies; molds; pipe fittings, bathroom hardware, and plumbing fixtures; instrument and meter parts; screws; printing and engraving plates; musical instruments; chemical apparatus and machinery; metal office and home furniture.

New applications are constantly being discovered and this list may be expanded as time goes on. Continual research should expand the use of electropolishing, cast additional light on its technical and economic limitations in order that it may become a better tool for the production man. In a large part, success of electropolishing methods depends on intelligent use in the proper places; it has demonstrated that it has economic value and that it can compete successfully with other finishing methods under certain conditions.

Metallic Coating of Hardware

WHEN parts are immersed in a plating solution, such as used for galvanizing, cadmium plating, nickel plating, etc., it is important for the plater and the cost estimator to know how much time is needed for the pieces to obtain the required thickness of metal coating, and current required.

As it is most practical for quantity production to weigh the parts that are to be plated, in preference to counting the number of pieces, the values in accompanying table were computed on a weight basis. They cover standard hexagon-head bolts for sizes ¼ to 4 in. and lengths from ⅜ to 15 in., giving the sum of the areas over the surfaces of the head, the unthreaded and threaded portions per 100 lb of bolts, and also the weight of 100 bolts. (Comments and data in tables were supplied by J. I. Hommel, Engineering Laboratories and Standards, Westinghouse Electric Corp., East Pittsburgh, Pa.)

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[4]Pray and Faust, "Comments on Electrolytic Polishing of Metals", *The Iron Age*, April, 1940.

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[7]U. S. Patent 2,331,721; U. S. Patent 2,-335,354; to Rustless Iron & Steel Corp.

[8]Blum and Rawdon, Trans. Electrochemical Society, 44-305, 1923.

[9]Ollard, Trans. Faraday Society, 21-81, 1925; also Roehl, *The Iron Age*, Sept. 26, 1940; Oct. 3, 1940.

Weights and Surface Areas of Hexagon Head Steel Bolts

BOLT LGTH	1/4 - 20		5/16 - 18		3/8 - 16		7/16 - 14		1/2 - 13		5/8 - 11		3/4 - 10		7/8 - 9		1 - 8		1-1/8 - 7		BOLT LGTH
	WT OF 100 BOLTS	AREA PER 100 LB	WT OF 100 BOLTS	AREA PER 100 LB	WT OF 100 BOLTS	AREA OF 100 LB	WT OF 100 BOLTS	AREA OF 100 LB	WT OF 100 BOLTS	AREA OF 100 LB	WT OF 100 BOLTS	AREA OF 100 LB	WT OF 100 BOLTS	AREA OF 100 LB	WT OF 100 BOLTS	AREA OF 100 LB	WT OF 100 BOLTS	AREA OF 100 LB	WT OF 100 BOLTS	AREA OF 100 LB	
	LB	SQ FT	LB	SQ FT	LB	SQ FT	LB	SQ FT	LB	SQ FT	LB	SQ FT	LB	SQ FT	LB	SQ FT	LB	SQ FT	LB	SQ FT	
3/8	1.03	57.7	1.93	46.5																	3/8
1/2	1.16	60.2	2.14	47.0	3.26	39.6															1/2
5/8	1.30	62.2	2.35	49.6	3.57	39.4	5.10	34.6													5/8
3/4	1.47	59.5	2.62	47.2	3.96	39.4	5.61	33.5	8.13	29.7											3/4
7/8	1.60	60.6	2.83	48.5	4.26	40.3	6.06	34.2	8.71	30.0	15.7	24.2									7/8
1	1.73	62.1	3.06	49.3	4.58	41.0	6.45	35.0	9.23	31.0	16.6	24.4	26.5	19.8							1
1-1/4	2.08	58.4	3.57	47.8	5.33	39.8	7.31	35.9	10.4	31.2	18.4	24.9	29.1	20.2	43.6	17.0					1-1/4
1-1/2	2.43	55.4	4.02	48.2	5.98	40.2	8.38	34.2	11.8	29.8	20.4	24.6	32.0	20.2	46.4	18.2	64.4	16.3			1-1/2
1-3/4	2.77	53.6	4.56	46.4	6.78	38.4	9.45	32.9	13.2	28.8	22.5	23.8	34.5	19.1	50.6	17.7	69.8	15.6	94.8	14.9	1-3/4
2	3.12	52.1	5.12	44.4	7.56	37.2	10.6	32.2	14.3	29.6	24.5	23.7	37.6	18.7	55.0	17.7	74.6	15.7	101	13.5	2
2-1/4	3.47	51.0	5.63	43.6	8.34	36.1	11.4	32.7	15.7	28.7	26.7	23.0	40.8	18.2	57.6	17.7	80.1	15.3	108	13.2	2-1/4
2-1/2	3.82	49.8	6.17	42.4	9.12	35.4	12.4	31.9	17.1	28.0	28.6	23.3	43.6	18.2	62.8	17.0	85.6	15.0	114	13.6	2-1/2
2-3/4	4.16	48.8	6.70	41.6	9.90	34.5	13.5	31.1	18.5	27.3	30.6	22.9	46.6	17.8	67.0	16.6	91.2	14.7	121	13.3	2-3/4
3	4.47	49.4	7.26	40.7	10.7	33.9	14.6	30.4	19.9	26.8	32.8	22.4	49.4	18.0	71.2	16.3	96.8	14.4	127	13.5	3
3-1/4	4.81	48.8	7.80	40.0	11.5	33.2	15.6	30.0	21.3	26.3	35.1	22.0	52.6	17.6	76.0	15.9	102	14.5	133	13.6	3-1/4
3-1/2	5.16	47.8	8.34	39.6	12.3	32.9	16.7	29.5	22.7	25.8	37.1	21.8	55.7	18.5	79.8	15.8	107	14.3	140	13.4	3-1/2
3-3/4	5.52	47.7	8.91	39.0	13.1	32.6	17.8	29.0	24.0	25.5	39.3	21.4	58.8	18.2	84.0	15.6	113	14.1	147	13.1	3-3/4
4	5.86	46.8	9.42	38.7	13.9	32.1	18.8	28.7	25.7	24.9	41.6	21.0	62.0	17.9	88.2	15.4	116	15.1	152	13.6	4
4-1/2	6.55	46.6	10.5	37.8	15.4	31.4	20.9	28.0	28.2	24.6	45.8	20.4	68.2	17.5	96.1	15.4	127	14.6	166	13.2	4-1/2
5	7.24	45.4	11.2	39.3	16.9	31.8	23.1	27.5	30.9	24.2	50.4	20.0	75.2	17.1	105	15.0	138	14.2	180	12.9	5
5-1/2	7.94	44.8	12.3	38.5	18.4	31.3	25.2	27.1	33.7	23.9	54.6	19.8	80.6	16.8	113	14.7	149	13.9	193	12.6	5-1/2
6	8.64	44.4	13.4	37.9	20.0	30.8	27.1	27.5	36.3	24.2	58.8	19.2	86.8	16.6	122	14.4	160	13.5	208	11.8	6
6-1/2	9.33	44.0	14.4	37.5	21.6	30.5	29.2	27.0	39.1	23.8	63.4	18.8	93.0	16.4	131	14.2	171	13.4	222	12.2	6-1/2
7	10.0	43.5	15.5	37.0	23.2	30.3	31.5	26.7	41.9	23.8	67.6	18.6	100	16.0	139	14.1	183	13.0	236	11.9	7
7-1/2	10.7	43.4	16.6	36.8	23.9	31.1	33.5	26.6	44.4	23.4	71.8	18.8	106	15.9	147	14.0	194	13.0	250	11.7	7-1/2
8	11.4	43.2	17.7	36.4	26.3	29.5	35.7	26.2	47.3	23.1	75.8	19.0	111	16.2	156	13.8	205	12.8	264	11.5	8
9	12.8	42.6	19.9	35.7	29.4	29.3	39.9	25.9	53.0	22.7	84.6	18.6	124	15.8	172	13.8	227	12.5	292	11.2	9
10	14.2	42.3	22.0	35.3	32.6	28.9	44.2	25.4	58.6	22.4	93.1	18.3	136	15.7	189	13.5	249	12.3	320	11.1	10
11	15.6	42.0	24.2	34.9	35.7	28.8	48.4	25.3	64.0	22.2	102	18.2	147	15.6	206	13.3	271	12.1	348	10.8	11
12	17.0	41.7	26.4	34.8	38.8	28.7	52.6	24.9	69.6	21.9	111	17.8	161	15.3	223	13.2	293	11.9	372	10.8	12
13	18.4	41.6	28.5	34.6	42.0	28.3	56.8	24.6	75.0	21.8	119	17.8	173	15.1	240	13.0	316	11.7	404	10.6	13
14	19.7	41.3	30.7	34.4	45.1	26.9	61.2	24.4	80.6	21.6	128	17.7	186	15.0	257	12.9	338	11.6	433	10.4	14
15	21.2	41.2	32.9	34.1	48.2	28.1	65.4	24.6	86.2	21.6	136	17.6	198	14.9	274	12.8	360	11.5	461	10.3	15

BOLT LGTH	1-1/4 - 7		1-1/2 - 6		1-3/4 - 5		2 - 4-1/2		2-1/4 - 4-1/2		2-1/2 - 4		2-3/4 - 4		3 - 3-1/2		3-1/2 - 3-1/4		4 - 3		BOLT LGTH
	WT OF 100 BOLTS	AREA PER 100 LB	WT OF 100 BOLTS	AREA PER 100 LB	WT OF 100 BOLTS	AREA PER 100 LB	WT OF 100 BOLTS	AREA PER 100 LB	WT OF 100 BOLTS	AREA PER 100 LB	WT OF 100 BOLTS	AREA PER 100 LB	WT OF 100 BOLTS	AREA PER 100 LB	WT OF 100 BOLTS	AREA PER 100 LB	WT OF 100 BOLTS	AREA PER 100 LB	WT OF 100 BOLTS	AREA PER 100 LB	
	LB	SQ FT	LB	SQ FT	LB	SQ FT	LB	SQ FT	LB	SQ FT	LB	SQ FT	LB	SQ FT	LB	SQ FT	LB	SQ FT	LB	SQ FT	
2	134	12.1																			2
2-1/4	143	11.8	222	10.3																	2-1/4
2-1/2	150	12.2	235	10.1	342	8.64															2-1/2
2-3/4	158	11.9	248	9.87	357	8.72	510	7.63													2-3/4
3	166	12.1	256	10.3	372	8.66	529	7.68	725	6.48											3
3-1/4	173	12.2	269	10.1	387	8.59	548	7.75	745	6.60	985	5.82									3-1/4
3-1/2	182	12.0	282	9.91	402	8.47	567	7.80	774	6.61	1015	5.86	1290	5.36							3-1/2
3-3/4	190	11.8	294	9.80	417	8.60	586	7.84	800	6.64	1046	5.90	1327	5.38	1665	4.97					3-3/4
4	197	12.2	306	9.68	431	8.56	608	7.74	820	6.81	1076	5.96	1363	5.44	1712	5.00	2900	3.99			4
4-1/2	214	11.8	328	9.85	461	8.78	652	7.56	876	6.66	1145	5.81	1448	5.33	1805	5.04	3020	4.04	4265	3.53	4-1/2
5	232	11.5	353	9.63	491	8.49	697	7.38	934	6.56	1203	6.04	1520	5.46	1890	5.10	3140	4.08	4423	3.56	5
5-1/2	249	11.3	378	9.40	521	8.37	736	7.46	987	6.51	1265	6.05	1595	5.50	1988	5.00	3280	4.03	4600	3.53	5-1/2
6	265	11.1	398	9.71	551	8.37	780	7.31	1044	6.44	1334	5.94	1677	5.42	2075	5.06	3395	4.08	4760	3.55	6
6-1/2	283	10.9	422	9.56	574	8.33	825	7.18	1091	6.54	1395	6.00	1750	5.48	2170	5.04	3530	4.08	4925	3.55	6-1/2
7	301	10.7	448	9.37	612	8.16	870	7.06	1146	6.44	1465	5.90	1824	5.42	2258	5.08	3650	4.10	5080	3.60	7
7-1/2	318	10.5	472	9.25	641	8.08	913	7.00	1204	6.26	1535	5.80	1920	5.31	2344	5.11	3770	4.14	5240	3.61	7-1/2
8	335	10.4	496	9.08	672	7.99	958	6.88	1266	6.22	1602	5.75	2088	5.16	2445	5.05	3900	4.10	5420	3.58	8
9	368	10.2	548	8.90	732	7.88	1048	6.70	1375	6.08	1740	5.61	2173	5.10	2645	4.92	4180	3.99	5780	3.50	9
10	404	9.87	598	8.65	794	7.70	1137	6.56	1510	6.04	1880	5.48	2340	5.01	2845	4.79	4450	3.94	6130	3.44	10
11	439	9.83	647	8.53	853	7.60	1228	6.43	1595	5.84	2018	5.37	2515	4.88	3040	4.70	4720	3.87	6480	3.39	11
12	474	9.65	698	8.35	915	7.52	1316	6.32	1705	5.76	2158	5.28	2677	4.82	3240	4.62	5000	3.81	6840	3.34	12
13	508	9.55	748	8.25	975	7.47	1400	6.26	1822	5.66	2295	5.19	2840	4.75	3440	4.54	5260	3.76	7200	3.30	13
14	543	9.42	798	8.10	1035	7.40	1494	6.16	1935	5.58	2435	5.12	3010	4.68	3650	4.46	5540	3.72	7550	3.25	14
15	578	9.31	848	8.05	1097	7.32	1584	6.06	2048	5.43	2575	5.04	3180	4.62	3840	4.40	5810	3.67	7900	3.24	15

Multiple

By G. W. BIRDSALL
Associate Editor, STEEL

. . . makes five brazed joints simultaneously in typical small pressure vessel used as insecticide container. Millions of units processed by copper brazing in controlled atmosphere furnaces show process to be extremely effective low-cost mass production method of joining steel parts

POSSIBILITIES of copper brazing assemblies of steel parts so impressed N. M. Salkover some few years ago when he first became acquainted with the process that he formed his own company for the express purpose of furnishing such facilities to other manufacturers.

Designs Cut Costs: "The possibility of making even complicated machine parts from a number of individual pieces stamped out on high speed presses and brazed together to form a unit that functions as single piece of metal is interesting more and more manufacturers looking for postwar methods of production that will lower their costs," points out Mr. Salkover.

"The war has brought forth many outstanding examples of parts redesigned as composite stampings, as units made by this method are called. The article, 'Composite Stampings', STEEL, Oct. 12, 1942, p. 82 explained how typical redesigns increased production rates to as high as 150 times former speeds; cut costs as much as 70 per cent; reduced stock required sometimes to only half former requirements; cut machining costs to a mere fraction; and provided other similar important economies.

"Such parts," continues Mr. Salkover, "have been substituted for forgings and castings with exceptional success. Perhaps one of the most outstanding examples is the composite trigger housing for the .30-caliber carbine. See STEEL, Oct. 11, 1943, p. 194. Here 14 individual pieces stamped from steel strip are brazed together to make an extremely complicated shape that is substituted for a forged part to reduce machining time per part from 28.8 min to a total of only 7.2 min. The great savings in machining time are made possible by using high speed presses to do most of the 'cutting away' of metal, thereby getting the component parts to the shape desired during the stamping operation and thus avoiding the necessity for removing large amounts of stock when machining.

"It is important to note that this design cut overall production costs in half while permitting greater output than could be obtained from a comparable investment in equipment for the previous production method. More output per worker was also found to result."

Simultaneous Joining Easy: Mr. Salkover reports one of the features of copper brazing that interests many manufacturers is the ease with which almost any number of exceptionally strong, gas tight joints can be made simultaneously.

A recent visit to the Salkover Metal Processing plant in Chicago revealed work in process that well illustrates this and other important features of multiple copper brazing. There Larry Jacobsmeyer, plant manager, explained the various steps in assembling insecticide

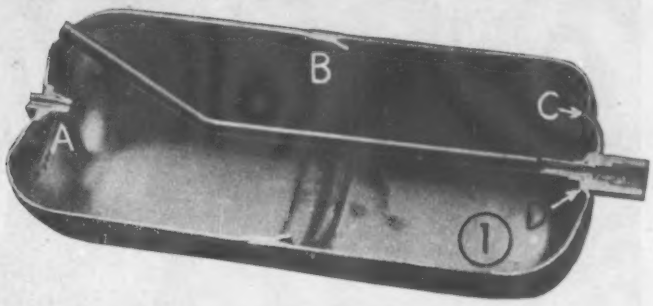
Fig. 1—Completed container sectionalized to show construction. Screw machine part brazed in at A for charging container; B is main joint; C, small pierced hole for "safety"; D, valve body, tube and cap assembled into container head by multiple joint

Fig. 2—Container parts: A—upper half; B—lower half; C, E and H—copper wire rings; D—tail fitting; F—tube; G—cap; K—copper wire slug; M—valve body

Fig. 3—Press assembly of tube, cap and valve body. Figs. 1-8 by G. W. Birdsall

Fig. 4 — Assembling fittings into upper and lower halves of container on separate lines

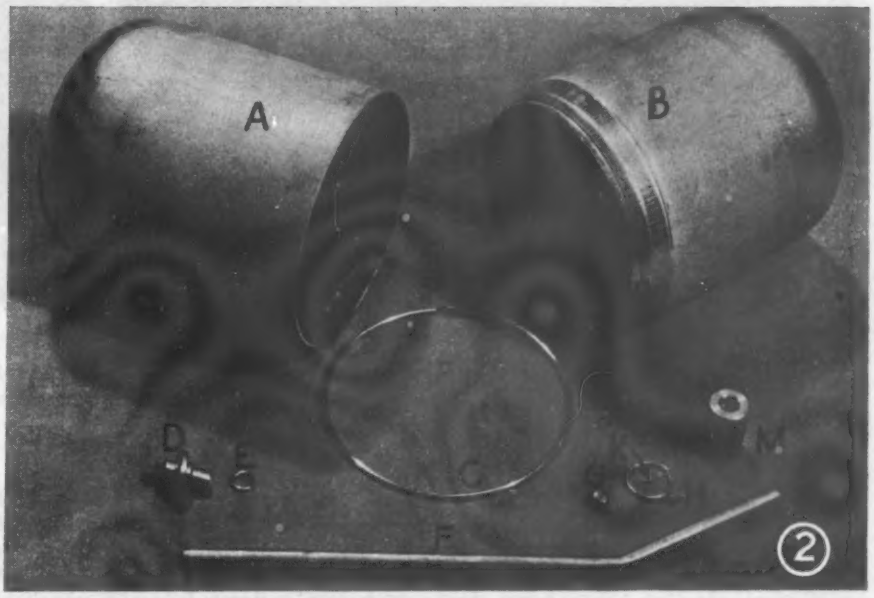
le Brazing

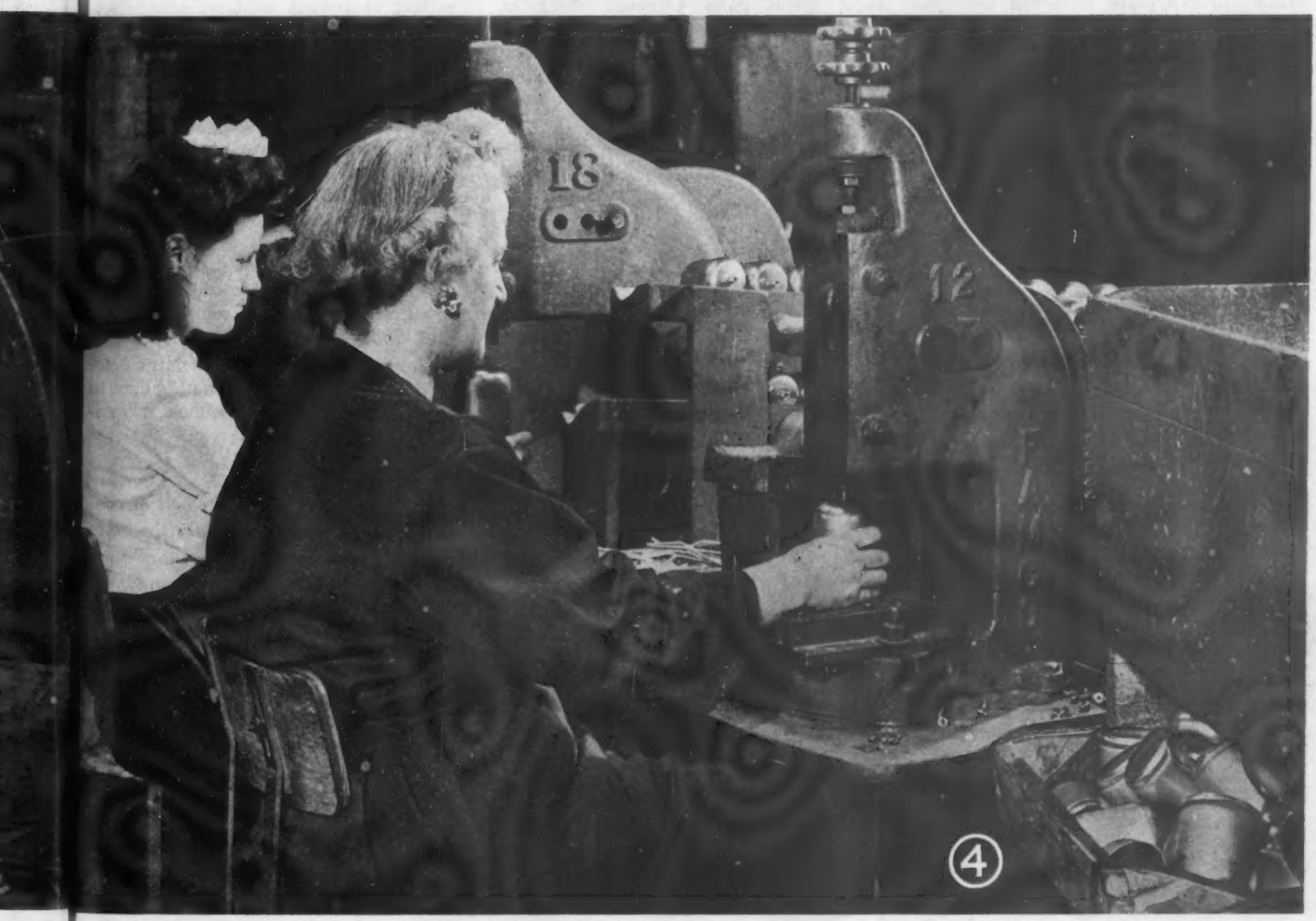


dispensers — one of their large volume items now in production for some time.

Assembly of the container which is capable of withstanding internal pressures of 1500 psi and over involves the use of three copper wire rings and a fourth small piece of copper wire to braze together the two halves of the container, the two fittings, the feed tube and the outlet seal — all pictured in Fig. 2. Five joints are made simultaneously as the unit goes through the brazing furnace.

Great Strength: Figs. 9 and 10 are before and after views of destructive test on an insecticide container whose section is like that in Fig. 1. Fig. 9 shows original shape of the container; Fig. 10 after application of pressure of 1600 psi. Note that despite grotesque distortion of





the thin sheet steel shell, the brazed joints did not fail.

Of particular interest is the middle seam where the two halves overlap approximately ⅛-in. for the main body joint. Although this joint expanded 15.5 per cent, it still remained intact. Containers are about 2¾-in. in diameter, 7 in. high; are made of 20-gage SAE 1010 steel, the two halves being deep drawn to cup shape from flat sheet involving approximately a 8½-in. deep draw.

Mr. Jacobsmeyer explains that this evidence of great joint strength is not unusual. "Most copper brazed joints in steel can be produced with strength closely approaching that of the base metal because with proper close press fit of mating parts, the copper melts and forms copper-iron alloys at the joint interface. Experience has shown that best results are obtained with press fits with interference around 0.001-in. per inch of diameter; that is, nominal dimension of the internal part should be 0.001-in. per inch larger than the mating part at contacting surfaces for relatively light sheet metal parts. Heavier stock of course requires less interference as too tight a fit would require excessively long periods in the brazing furnace to allow the copper to penetrate the joint completely.

"Generally," he adds, "it is almost impossible to get too tight a fit on light sheet metal parts. One precaution in brazing screw machine parts inside sheet metal parts is to watch that such a heavy press fit is not obtained as to tend to stretch the sheet metal parts beyond their elastic limit thus distorting the assembly. A loose joint is to be avoided because of the possibility that pure copper (of relatively low mechanical strength) will fill the space between the steel surfaces, resulting in a weak joint.

"Micrograph Fig. 11 shows why it is possible to develop almost the full strength of the steel in the joint itself. Note that here the line of the joint is almost entirely obscured by the fact that the grains have regrown across the joint line in many places. And the metal through the joint is not copper or steel but a copper-iron alloy formed by the molten copper alloying with the iron in the steel, which although not molten itself is able to absorb much of the copper at the brazing temperature of about 2050° F.

"These two factors account largely for the exceptionally high strength obtained in properly brazed assemblies. Translated into terms of service life, the

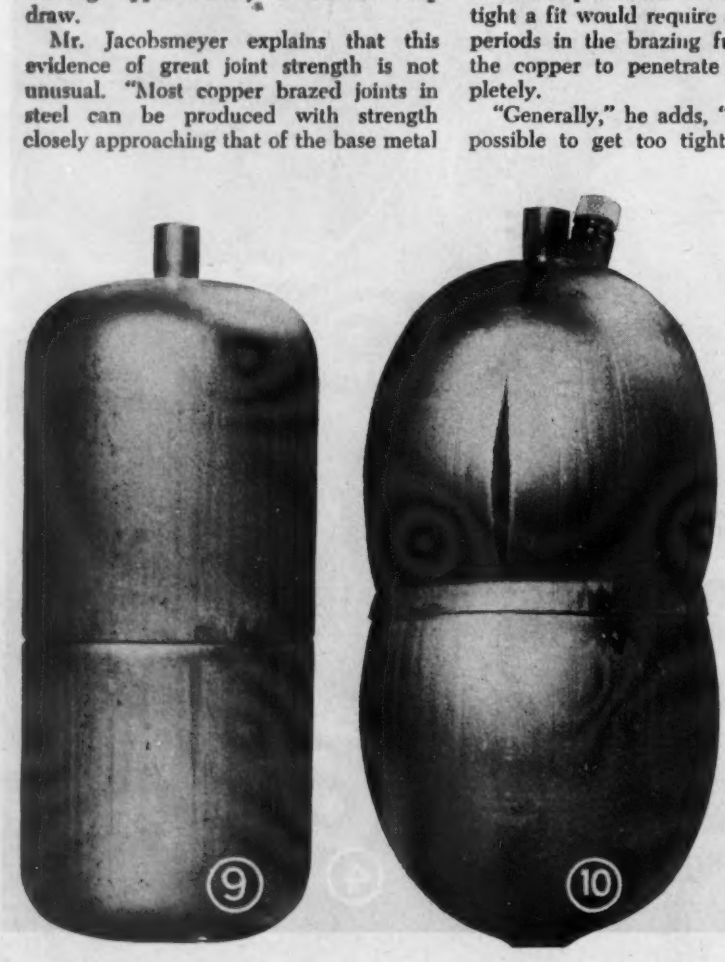


Fig. 5—At this station, operator places lower half of container in fixture, puts upper half on also, slides fixture in under head where it strikes against air valve in turn automatically operating the press. As a result, operation is extremely fast

Fig. 6—Batch type controlled-atmosphere brazing furnace has curtain of flame at door to prevent entrance of air when operator pushes heated rack of parts into cooling chamber back of main heating chamber

Fig. 9—Completed container before bursting test

Fig. 10—Container in Fig. 9 assumed this shape before failure at 1600 psi. Central joint did not fail, expanded 15.5 per cent

strength of the bond is such that the assembly functions as a single piece of metal with great resistance to vibration and impact and with no tendency to work loose," concludes Mr. Jacobsmeyer.

Whereas the shear strength of copper itself is only 20,000 psi, the copper-iron alloys formed in a good brazed joint will produce joint strengths closely approaching those of the steel itself. It is not unusual for joints to show shear strengths from 29,000 to 32,000 psi when the steel itself may only test 33,500 psi.

No Fluxing Required: While there are several methods of applying heat for brazing, the use of an electric furnace with an atmosphere that is controlled so as to be slightly reducing avoids the formation of any oxide film on the

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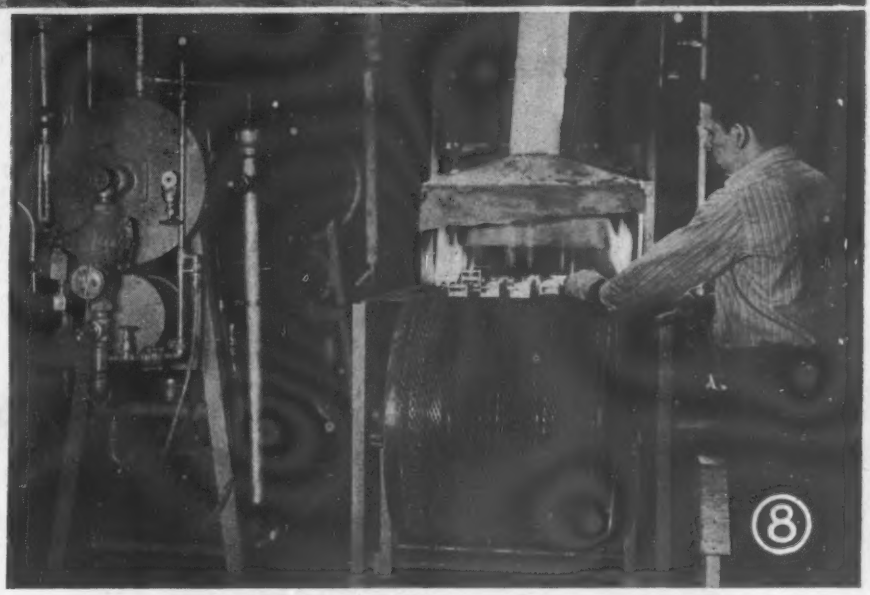


Fig. 7 — *Loading end of continuous brazing furnace. Unit is electrically heated, has controlled atmosphere*

Fig. 8—*Unloading end of continuous furnace showing mesh belt conveyor. Atmosphere generator can be seen at left*

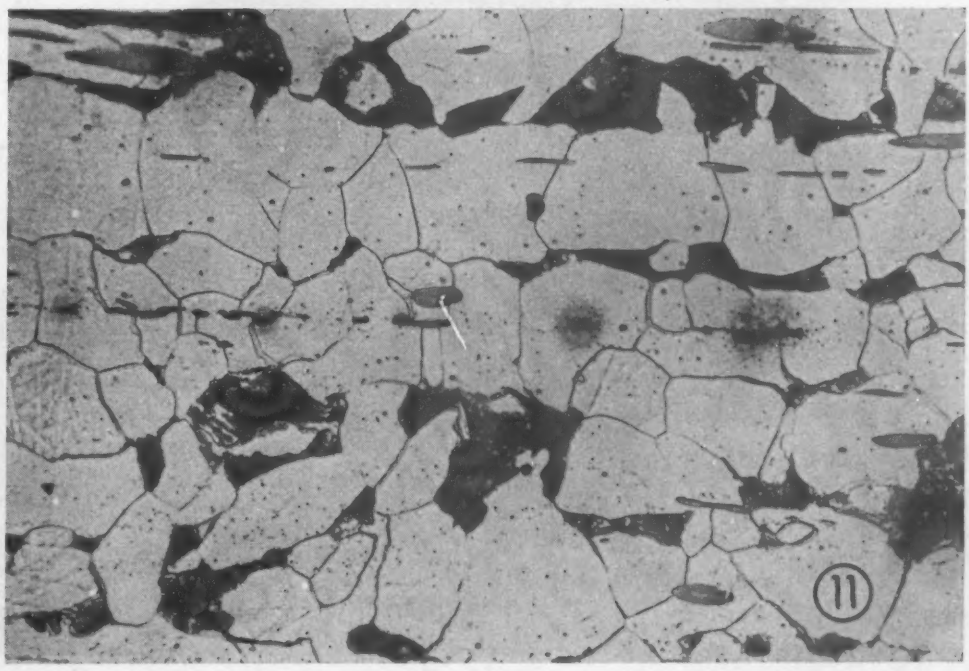
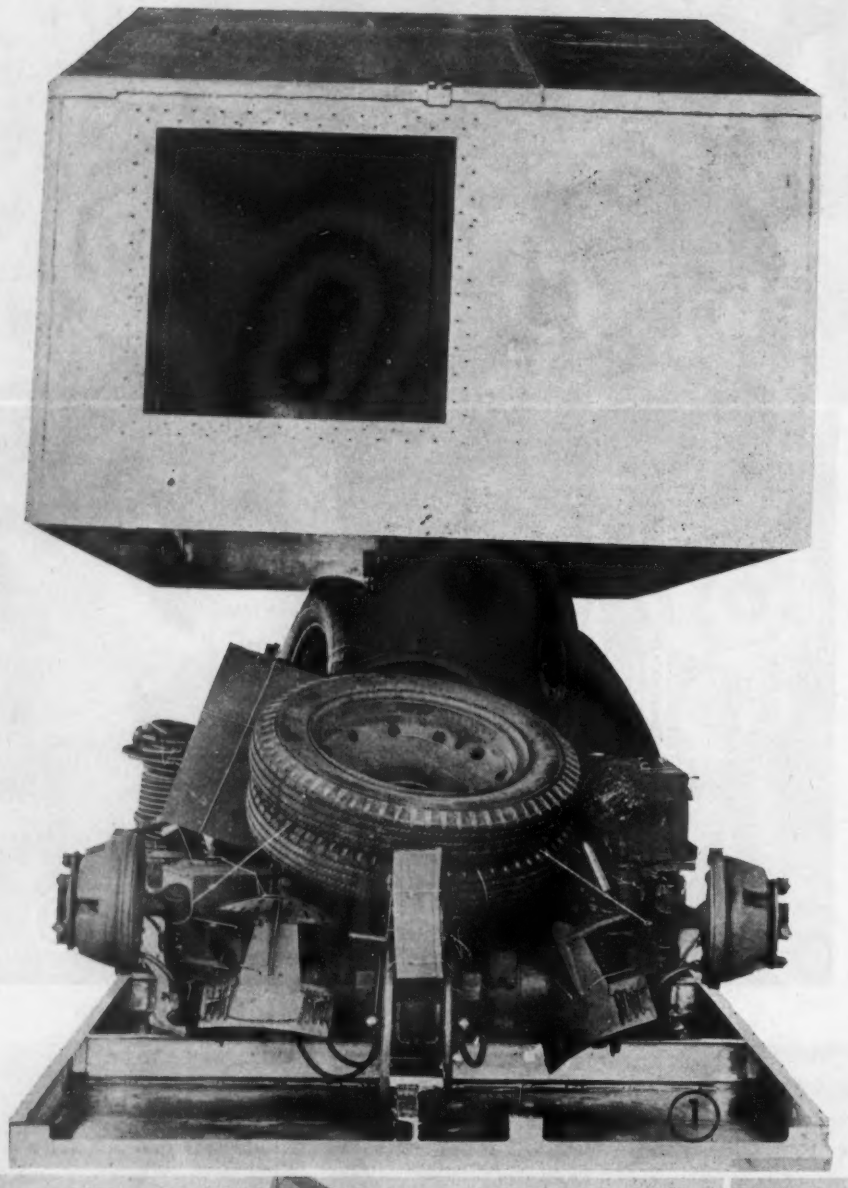


Fig. 11—*Note line of joint is almost completely obscured by grains grown during brazing, accounting for the great strength of brazed joints*

GUNS "CANNED"



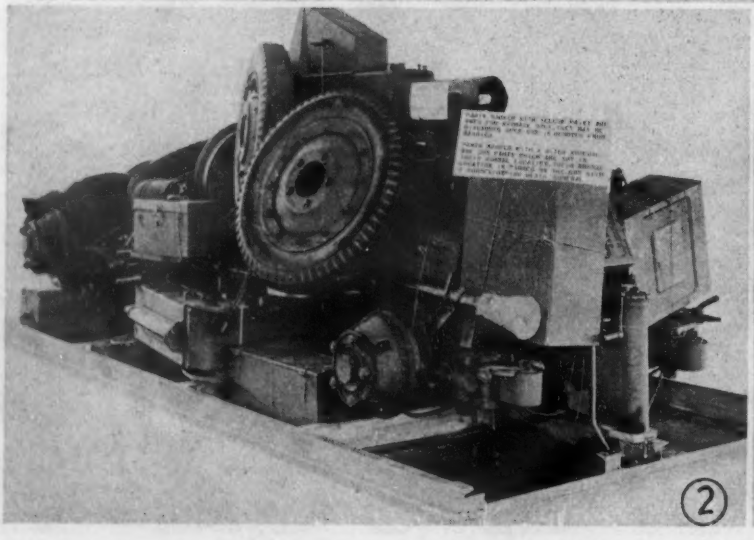
WAR MATERIEL amounting to millions of items constitutes a tremendous disposal problem now partially solved by newly developed methods to seal equipment in "cans". Army ordnance men have long dreamed of some storage method that would eliminate the need for extensive warehouses and the tedious cleaning and reapplication of protective oils and greases required every year when stored by conventional methods.

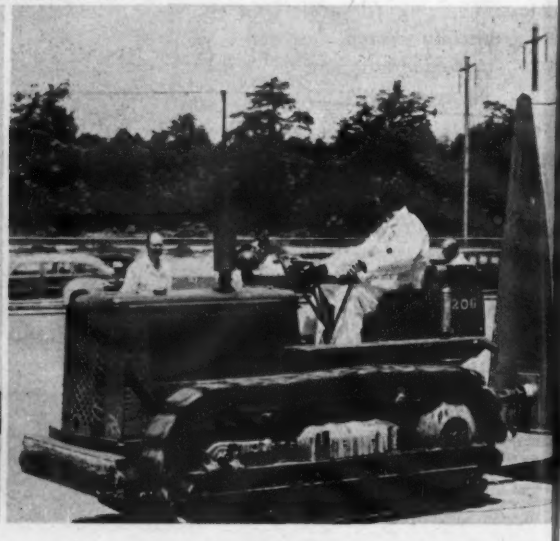
End of this war finds us with many times the amount of materiel that was left from World War I, with corresponding increase in the disposal problem. Now a method has been devised to store any amount of equipment desired in open fields. And it will be ready for immediate use, instead of requiring time-consuming cleaning and assembling. Guns, fire control instruments, and similar current materiel that is not expected to become obsolete quickly are to be

Fig. 1 — Cover of barrier being lowered in place on bed

Fig. 2—Another type of package designed to take the 40-mm gun and mount. Here are shown parts ready for enclosure

Fig. 3 — This 90-mm gun and mount is shown "canned" ready for open-field storage for any period up to 50 years. This improved storage method requires no warehouse and eliminates costly cleaning and regreasing required yearly by conventional methods of storage





. . . . FOR NEXT WAR

stored in containers made of heavy steel plate.

The corrosion problem was solved by pumping the air out of the hermetically sealed container and replacing it with nitrogen, an inert gas. Silica gel to absorb moisture is also placed in the container. But the weight of these units, plus their cost and the expense of the nitrogen made development of a lighter container desirable.

Newest units, known as the "balanced pressure barrier," are made of aluminum, are not hermetically sealed but have provision for "breathing" and so need not possess the rigid construction of the sealed type of container. This is important feature, for the lightweight construction enables the gun to be packaged anywhere and then hauled or shipped easily to point of storage. The new "cans" were developed jointly by Aluminum Co. of America, Glenn L. Martin Co. and Davison Chemical Co.

To assure good condition of the equipment, it is necessary to keep the moisture content of the air in the container below a relative humidity of 30 per cent. This is done by means of the Davison solar radiation silica gel breather seen in the accompanying illustration. It contains provision for absorbing moisture from any air drawn into the container due to temperature or barometric changes. In addition, any moisture is prevented from being absorbed by infiltration from surrounding air when there is no flow of air into the container. Additional silica gel units inside the container remove moisture of entrained air and from surfaces of the equipment.

Aluminum was chosen because it assures minimum weight yet provides sufficient strength, ruggedness and long life. Being easy to fabricate, shape and weld, space required is a minimum since container can closely follow overall contour of the gun. It adds no appreciable weight to the gun, thus enabling it to be hauled about on its own standard gun carriage, simplifying the transportation problem. Tremendous expansion in aluminum producing facilities affords an ample supply of raw stock without dipping into supply of heavy metals needed for rebuilding operations in many countries of the world where these items will be packaged.

The containers will preserve a standing stock pile available in case of another national emergency. At the same time, this program will aid in maintaining proper balance of manpower and facilities in an industry vital in time of war.

It is estimated that the total cost of container and work of packaging will not exceed that of taking the equipment out of the warehouse, cleaning and over-

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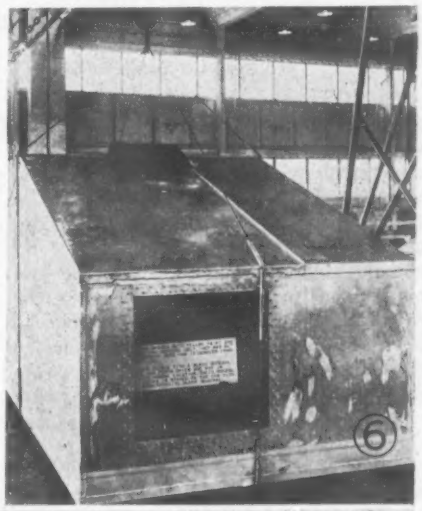


Fig. 4—This is the way the 90-mm gun looks when ready for packaging process

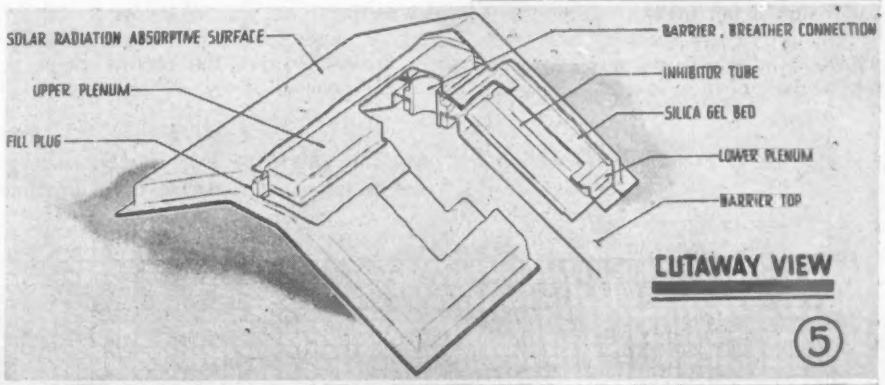
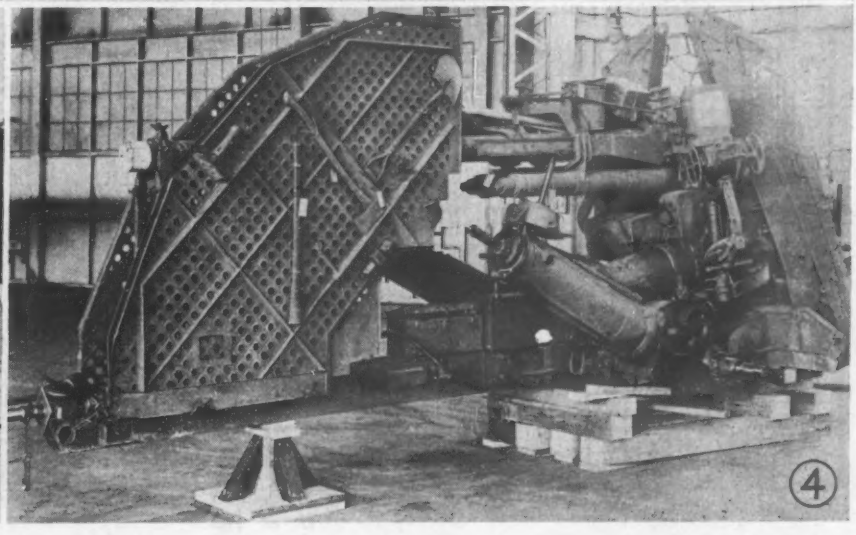


Fig. 5—Key to success of barrier is the Davison breather utilizing silica gel to remove moisture from air drawn into container by temperature or barometric changes. Other silica gel units inside container assure maintenance of less than 30 per cent humidity, the critical point for corrosion

Fig. 6—Finished package ready for storage in open. Note cover is sealed to base with arc welds



Modern HEAT TREATING Practice

Testing for hardenability and other characteristics in steels has developed successfully into four principal techniques described in this, the second article of Mr. Seasholtz' series. McQuaid-Ehn and Jominy tests; method and choice of quenching media are discussed

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Philadelphia

ALMOST every heat treater has tested or supervised some method of testing the hardenability of steel. It is known that some steels will give the required results in production while others will not. The specific inherent properties possessed by many steels are controlled not only by chemical composition but also by the method of manufacture, especially the deoxidation practice. It is possible to have several heats of steel furnished to the same specification, each possessing different hardenability. This factor, over which he has no control, has often caused the heat treater endless trouble.

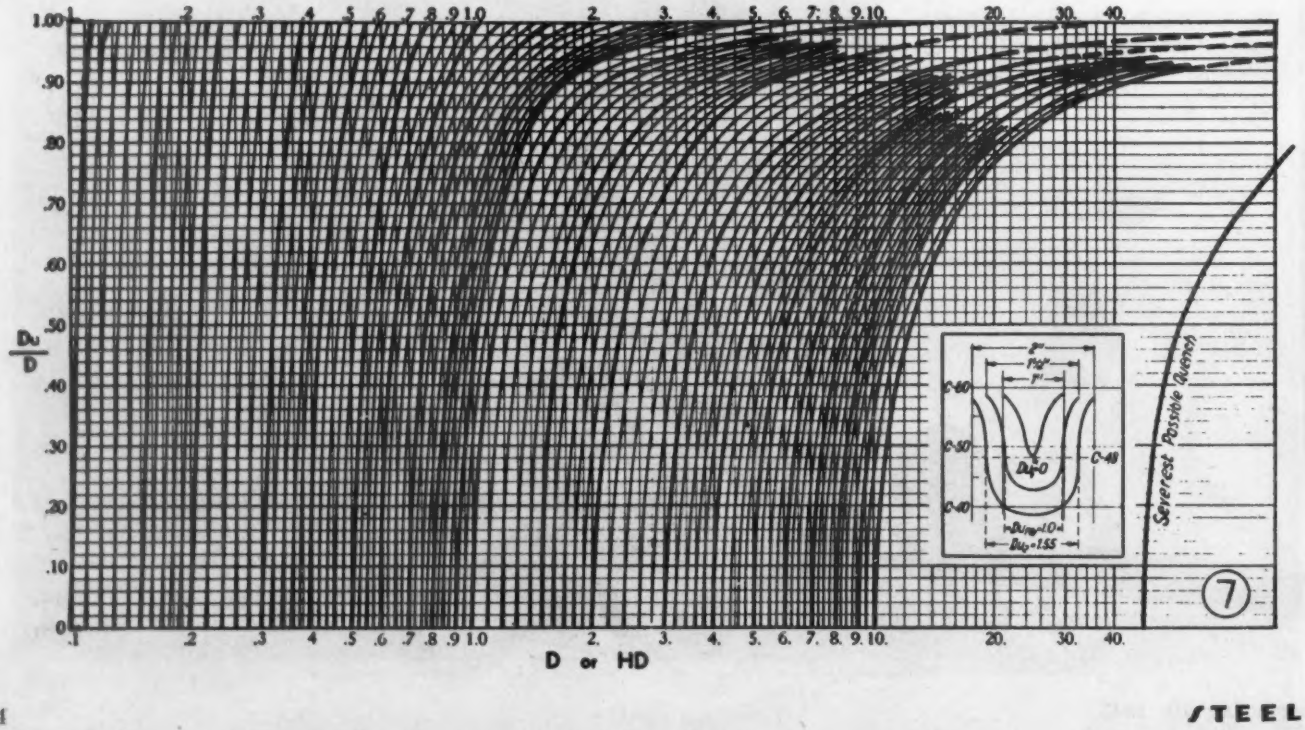
What the heat treater really needs is a steel with a definite hardenability. The heat treater is not really concerned with the chemistry, but requires steel with characteristics which will respond to the best method of heat treating that can be adapted to the parts he is treating.

Tension tests are made more frequently than other tests on metal. The statement has been made that alloy steels, regardless of composition, have very similar tension qualities when hardened.

Hardenability is an accepted test for the determination of tensile tests regardless of analysis, but special consideration must be made for high-impact values at low temperature, low-creep values at high temperatures, etc. The alloys considered for these special properties generally do not require the narrow range usually specified. Only a minimum is generally required. It is these facts that have caused the steel manufacturers and metallurgists to concentrate their efforts on specifying or furnishing steel for a particular purpose. Methods have been devised for the measurement of these characteristics so that the individual specification may be controlled, comparisons made between different types, and steels in general utilized more effectively. Many of the methods have been developed by individual plants, but the following tests for measuring hardenability are recognized and used nationally:

1. Test for austenitic grain size and abnormality, principally McQuaid-Ehn test and the oxidation method.
2. Jominy or end-quench test for hardenability.
3. Hardenability and quenching value by Grossmann.

Fig. 7—Hardenability and quenching charts. By these curves, severity of quench (heat transfer equivalent H) can be estimated. Courtesy Carnegie-Illinois Steel Corp.



Hardenability Calculated From Composition ⑧

By Marcus A. Grossmann

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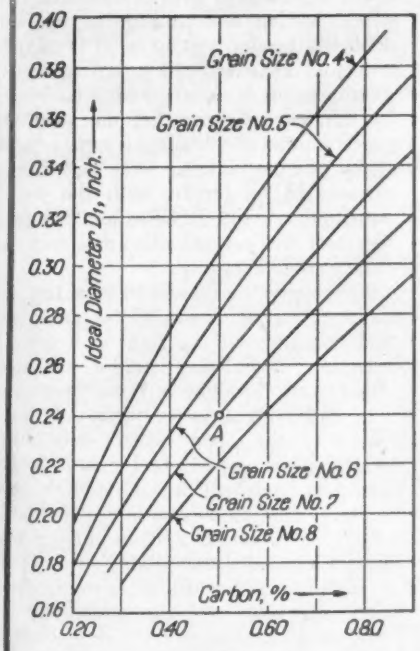
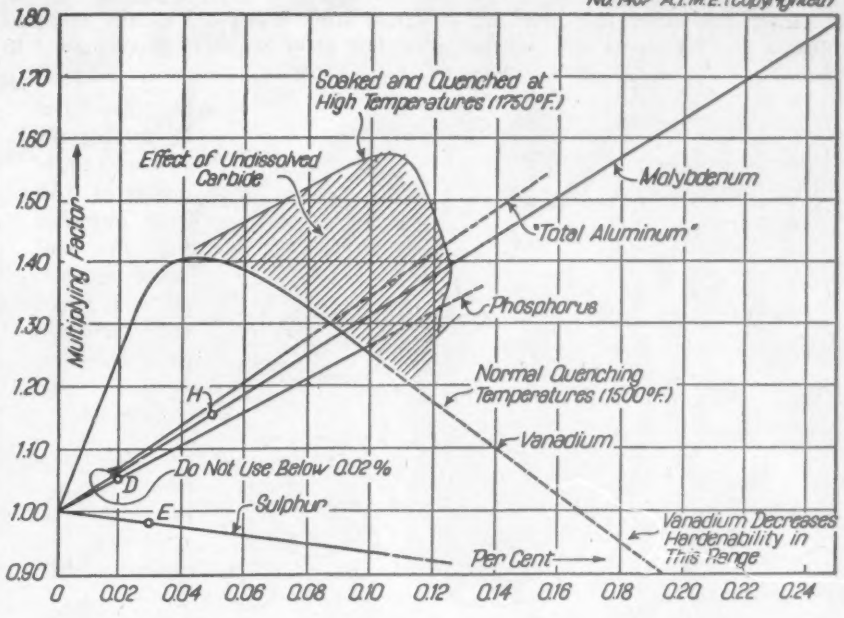
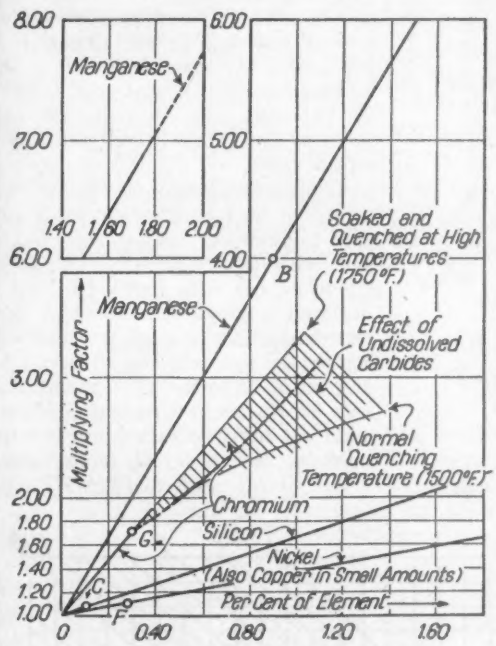
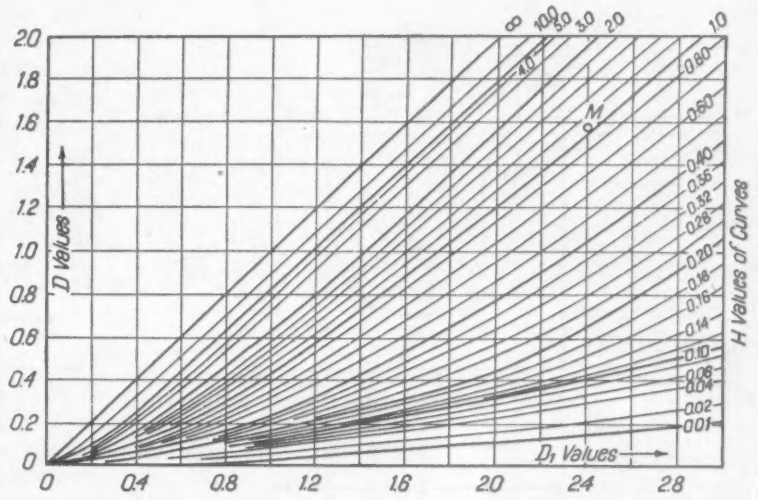
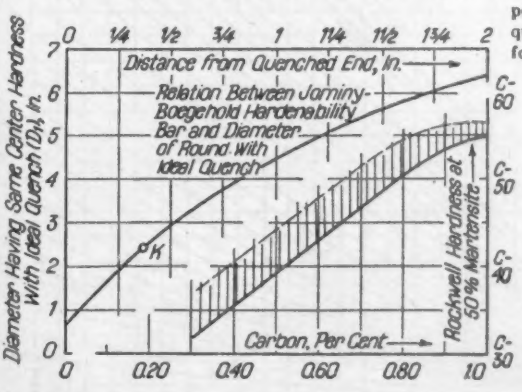









Distance from Quenched End, In.
Relation Between Jominy-Boegehold Hardenability Bar and Diameter of Round with Ideal Quench
Diameter Having Same Center Hardness with Ideal Quench (D), In.
Rockwell Hardness at 50% Martensite
Carbon, Per Cent
K

Example: To compute hardenability of a commercial steel of the analysis shown:

Item	Amount	Factor	Point
Grain size	7		
Carbon content	0.50	0.24	*A*
Manganese	0.90	4.00	*B*
Silicon	0.10	1.10	*C*
Phosphorus	0.020	1.05	*D*
Sulphur	0.029	0.98	*E*
Nickel	0.28	1.10	*F*
Chromium	0.30	1.70	*G*
Molybdenum	0.05	1.16	*H*
Copper	0.05	1.02	*

*Estimated on the line for nickel.

Ideal hardenability of given steel = D_1 = 0.24×4×1.1×1.05×0.98×1.1×1.7×1.16×1.02 = 2.40. Such figures for D_1 will accurately compare one steel with another.

Jominy equivalent of the given steel at point *K*, that is, hardness of center of ideally quenched 2.40-in. bar, is the same as that found 3/8-in. from end of end-quenched specimen.

Actual hardness at center, taken from lowest curve, is about C-45 for 0.50 carbon, low alloy steel.

H—VALUES FOR DIFFERENT MEDIUMS

Circulation or Agitation	Value of H for		
	Oil	Water	Brine
None	0.25 to 0.30	0.9 to 1.0	2
Mild	0.30 to 0.35	1.0 to 1.1	2 to 2.2
Moderate	0.35 to 0.40	1.2 to 1.3	....
Good	0.4 to 0.5	1.4 to 1.5	....
Strong	0.5 to 0.8	1.6 to 2.0	....
Violent	0.8 to 1.1	4	5

Example: Water quench, mildly agitated; H = 1.05; Steel D_1 = 2.40. Actual critical diameter D (from point *M* above D_1 = 2.40) is $1\frac{5}{16}$ in., size of bar of given steel that will harden in given quench to half martensitic structure at center; hardness C-45.

4. Tests for P-F penetration fracture-grain size by Shepherd.

McQuaid-Ehn Test

The McQuaid-Ehn test consists of heating a sample of steel in a carburizing mixture for 8 hours, at a temperature of 1700° F, and then slowly cooling it in the carburizing box. After this carburizing treatment, the sample is cut, polished, etched to bring out the grain boundaries and then carburized surface is examined under a microscope at 100 diameters magnification. The carburizing treatment develops definite grain boundaries which are readily visible. The magnified specimen then is compared with a standard chart showing eight different inherent grain sizes. Steels are usually classified as fine grain or coarse grain. Sizes 1 to 5 on the chart are classed as coarse gra while sizes 5 to 8 are classed as fine.

The terms "abnormal" and "normal" indicate a definite characteristic of a hea to develop a certain type of structure when carburized. In 1922 McQuaid-Ehn found that the structure after carburizing could be used to predict whether steel would harden uniformly or have a tendency to develop soft spots. If the hyper eutectoid zone showed coarse grains o relatively fine lamellar pearlite enveloped by thin excess cementite, the steel wa called normal and hardened satisfactorily If the pearlite lamellae were very coarse surrounded by ferrite, with the hyper-eutectoid cementite coarse and irregular, the steel was termed abnormal and har-dened unsatisfactorily.

Originally the McQuaid-Ehn test wa adapted for determining the grain siz and normality of the steel as a test for selecting carburizing grades of steel Their work brought out the fact grain size and normality was definitely attributed to the open hearth deoxidatic practices. Abnormal steel generally wa found in heats which have a high oxide content due to incomplete deoxidatio of the steel. Later, steel producers w able to control the normality of the s in both fine and coarse grain steels. Gr size was originally recognized by tool steel manufacturers and was cla fied as a "tough structure" (fine grain) a "dry fracture" (coarse grain). It known that the tough or fine-grain stru ture was an indication of good tools. T dry or coarse-grain structure was reco nized as being brittle and generally u satisfactory.

About 1932, various heats were ob served to heat treat satisfactorily in r gard to quenching to maximum hardn and with less distortion. Other hea quenched out with spotty hardness an distorted a great deal more. A typical experience with one of the major steel companies was that out of seven heats of steel made to the same chemical analysis, four heats heat treated satisfactorily and three heats quenched out with spotty hardness and distorted more than the

(*Please turn to Page* 172)

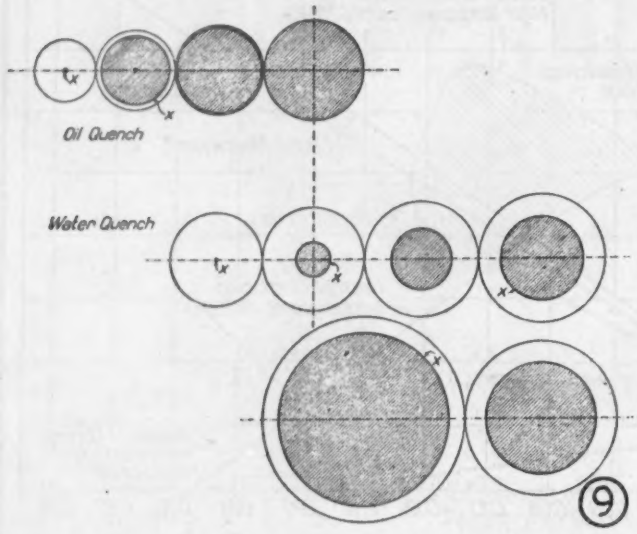


Fig. 9 — Effect of varying the diameter of rounds of SAE 3140, quenched from the same temperature into oil and water, represented by etched cross-sections (after Grossman)

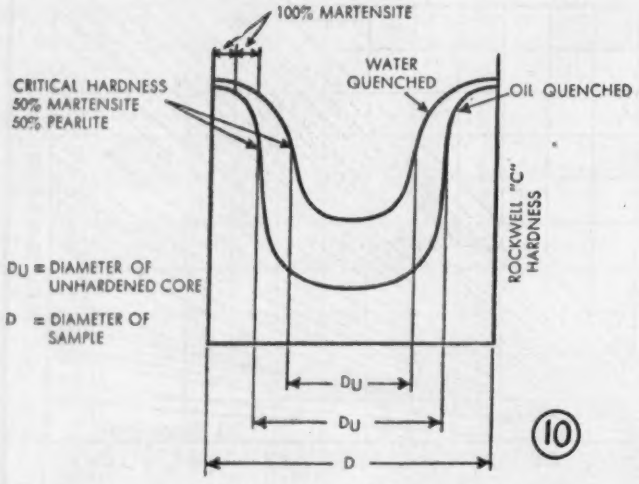
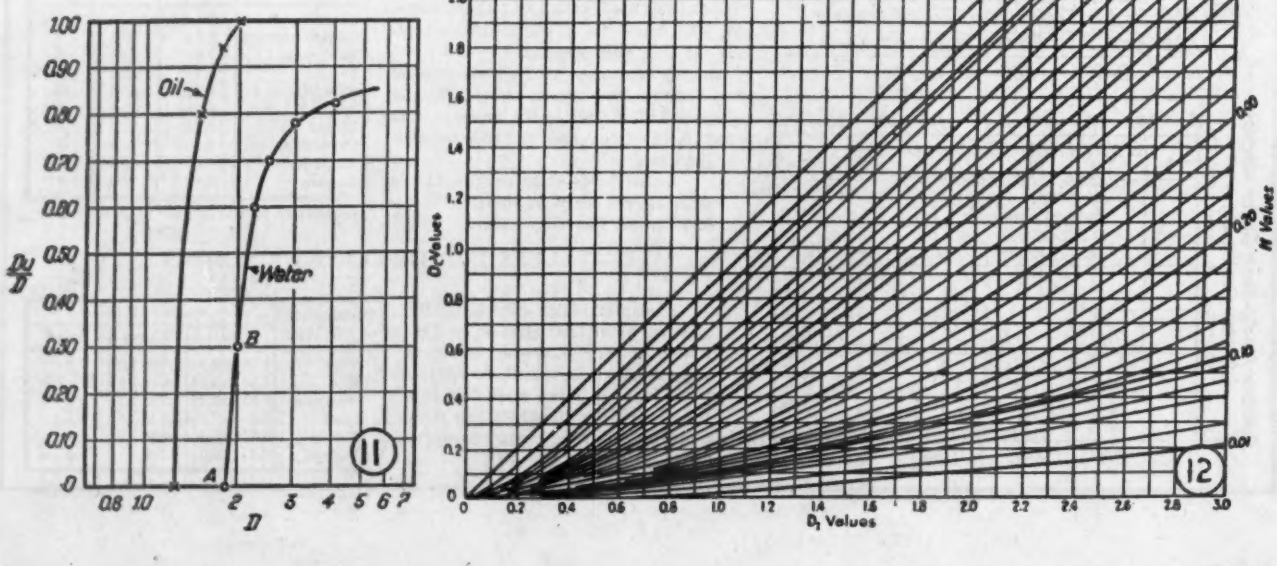


Fig. 10—Transverse hardness distribution for water and oil-quenched bar

Fig. 11—Original diameter (D) of rounds in Fig. 9 is here plotted as abscissae, and unhardened diameter (D_u) as ordinates, into curves showing how slope is controlled by quench

Fig. 12—Relationship between ideal critical size, critical size, and severity of quench



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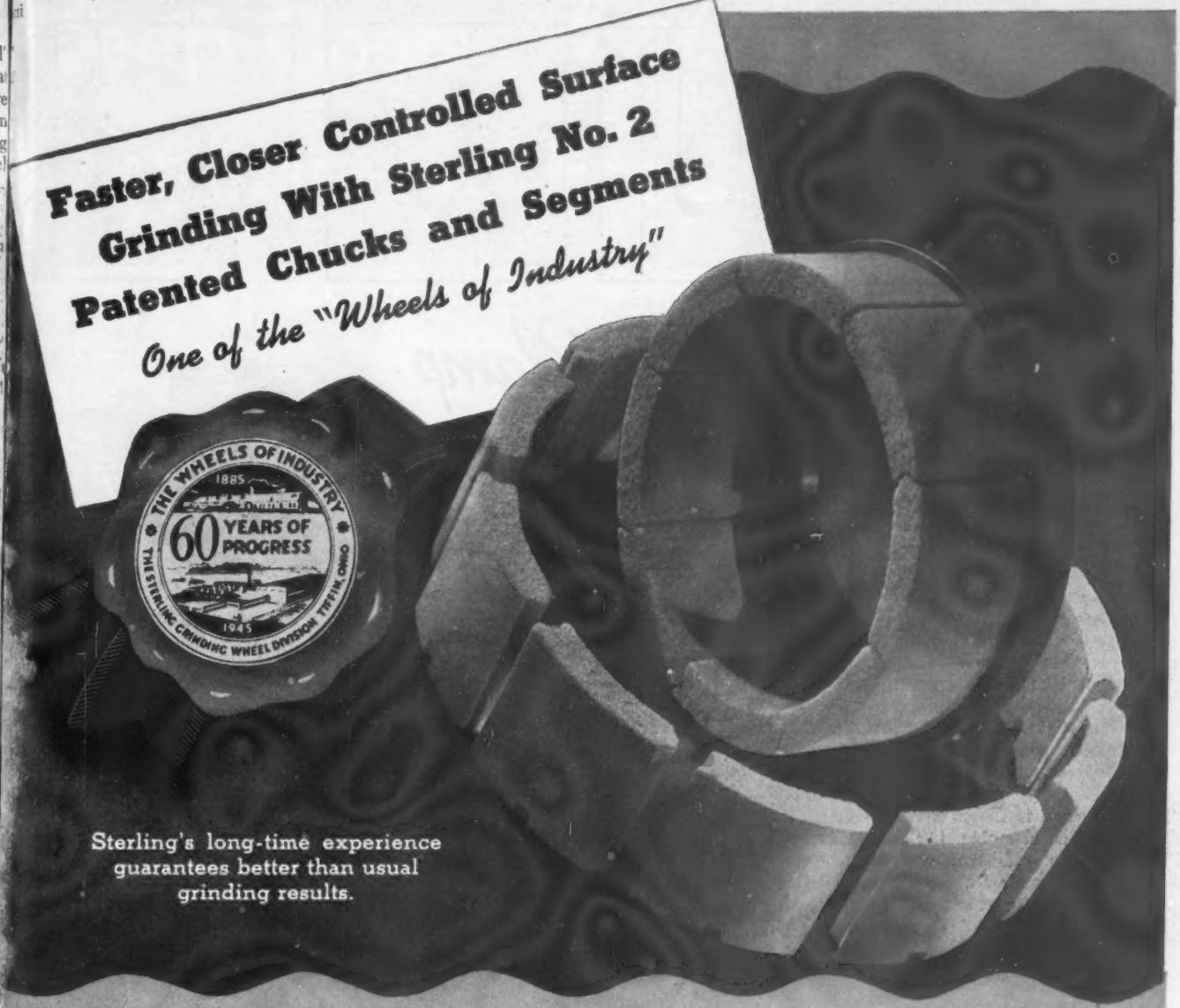

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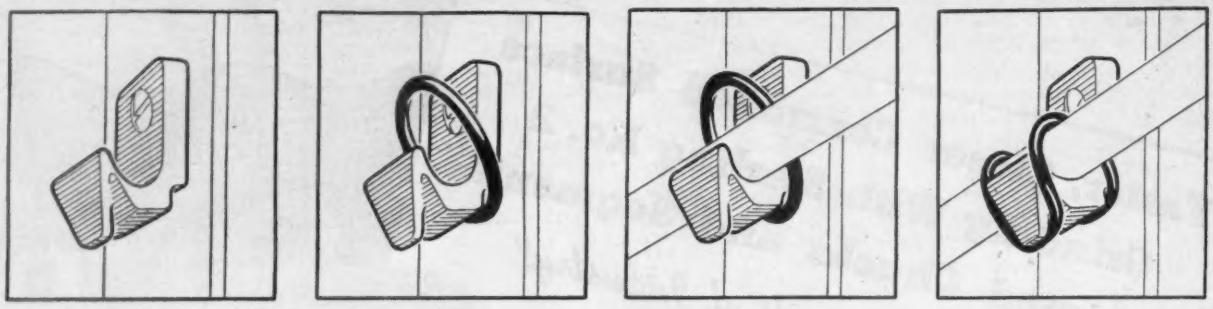
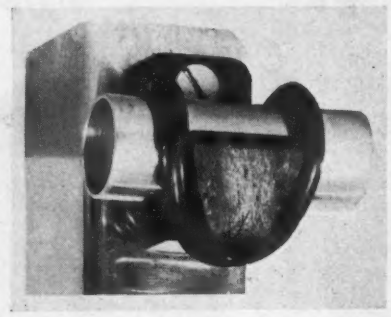


Tube and Conduit Clamp

—requires no tools for installation, and has no loose parts to be lost or broken



A NEW type clamp, particularly adaptable for tube and conduit type installations of all kinds, is shaped after an inverted lateral "S" and is fastened to the wall or frame with an ordinary screw. Tubing to be fastened is placed in the open side of the curve and the clamping ring passes around the back of the base, over the top of the tubing and down the front where it is hooked under the curve at the front of the "S" to form a simple locking device. This sequence is shown above.

The clamping ring can be made of a high grade synthetic rubber or other elastic material. At the present time, the Martin plants are using standard hydraulic seal "O" rings which have been rejected for use as hydraulic seals because of improper tolerances. The rubber ring also serves as a shock absorber in eliminating vibration. If it is damaged and requires replacement, this can be accomplished without removing the clamp body.

The clamp proper can be molded from a fabric base phenol fiber material or fabricated from formed sheet metal in any desired size. The combination results in a clamp which is extremely durable, yet light in weight and attractive. Units with various sizes of tubing locked in place are shown in the photo.

Now being used in plane installations for fastening hydraulic and pneumatic tubing, wire bundles and electrical conduits, the bodies are molded in color to follow individual hydraulic or electrical runs.

The clamp is an answer to the "mechanic's prayer" for, in addition to needing no tools for installation or removal of objects, the clamps afford other conveniences. There are no loose parts to be lost or broken, and, when the clamps are used in a series, any single tube or conduit can be removed without disturbing the others. The clamp also is adaptable for bonding and fastening purposes.

Though the Glenn L. Martin Co., Baltimore, which developed these clamps, has not started production of large quantities at the present time, this work will get under way soon, either through their own facilities or those of a licensee organization.

Heil Co. Uses Pallets for Handling Materials

Pallets are used for handling practically all types of miscellaneous materials in warehouse of Heil Co., Milwaukee, as shown in accompanying illustration. Goods are palletized when received and usually need no further manual handling until released. Fork trucks, manufactured by Clark Tructractor Division of Clark Equipment Co., Battle Creek, Mich., convey materials to proper bays and stack in less time than was required formerly.

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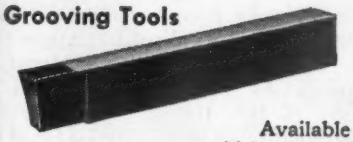

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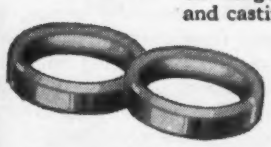

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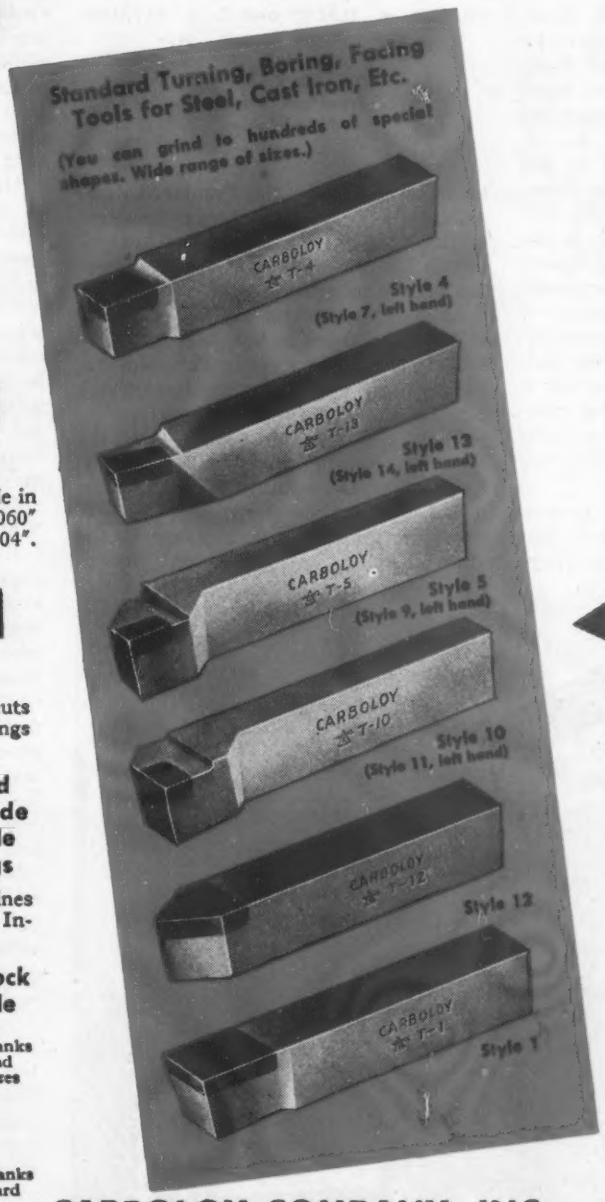

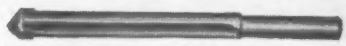

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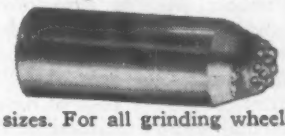

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Sizes 1/16" to ½" thick.

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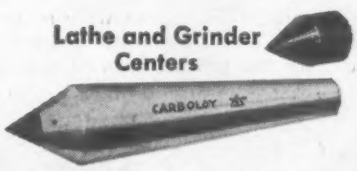

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High-Speed X-Rays

Field emission X-ray technique used to study action of projectiles at Frankford Arsenal may provide means to radiograph valve components in operation and other industrial subjects. Preceding article discussed tube and circuit development

CHARLES M. SLACK* and C. T. ZAVALES†
Westinghouse Electric Corp.
and
EDWARD R. THILO‡
Frankford Arsenal
Philadelphia

PICTURES published in 1940, showing some of the phenomena that could be revealed by means of high-speed X-ray pictures (golf ball, shot gun shot), came to the attention of men at the Frankford Arsenal Laboratory. Colonel L. S. Fletcher, at that time director of the laboratory, and the men under him recognized the possibilities of applying this new tool to the field of ballistics. It was arranged at this time to have the experimental equipment used at Westinghouse brought to the Arsenal for a series of tests. High speed X-ray pictures were obtained of 30-caliber armor piercing bullets penetrating a 1¾-in. diameter aluminum rod. The pictures gave useful information about the behavior of the bullet and the manner in which the penetration took place.

Results of these tests were so promising that the Laboratory ordered four units of the present form of this equipment developed for the Frankford Arsenal. The first of these units was delivered to the Ballistics Section of the Laboratory in January, 1942, and the equipment has been in constant use ever since.

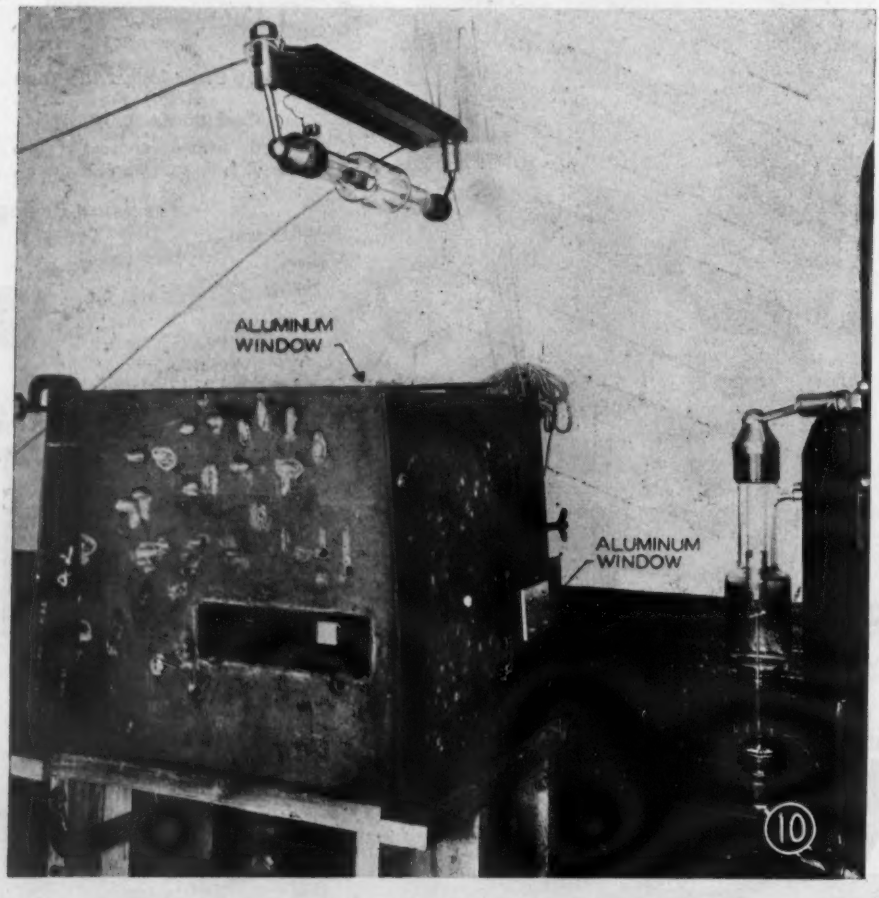
As X-ray exposures are on the order of 1/1,000,000-sec or less, it is necessary to use intensifying screens. Patterson No. 245 Industrial Combination Intensifying Screens have been used exclusively.

First problem investigated at the Frankford Arsenal was the field of terminal ballistics—a study of what happens to the bullet when it strikes a piece of armor, and also what happens to the armor during the penetration process. Ordinary photographic methods, including high speed photography, run into the difficulty of having the actual penetration obscured by luminous fragments thrown back at the time of impact. This difficulty is, of course, not present in the case of X-rays.

High speed X-ray pictures were taken of armor piercing bullets during actual penetration. Two mutually perpendicular pictures were taken of the bullet as it penetrated the armor. Pictures were taken simultaneously or in sequence. Fig 10 shows the experimental set-up used in taking these pictures. The horizontal tube is connected to the surge generator by ¼-in. diameter copper tubing. No trouble was encountered in "piping" the high voltage around by means of this tubing which provides greater flexibility in the positioning of the X-ray tube.

Fig. 12 includes two mutually perpendicular high speed X-ray pictures, taken in sequence, of a 30-caliber armor piercing bullet penetrating a small 2 x 2-in. piece of ½-in. thick armor. A stationary picture of the bullet is at left. In the center, the first of the high speed X-ray pictures shows the core of the bullet penetrating ⅜-in. into the armor, and one can see fragments of the bullet jacket and of armor splashing back. The jacket, which cannot penetrate the armor, has telescoped forward on itself and exposed the base to the core. Second high speed X-ray picture, at right, was taken of this same bullet approximately 20 microseconds after the first picture. The core of the bullet has penetrated the armor and its tip is projecting through the back. Part of the armor pushed out by the penetration can be seen. The jacket of the bullet has continued to telescope on itself and even more of the base of the core is in evidence. Other high speed X-ray pictures taken during this study showed the flow of the jacket material and the breaking up of the core as the bullets penetrated the armor.

High speed X-ray equipment is preeminently fitted to study bullet motion and behavior inside a gun barrel. No other means is available for taking a picture of a bullet as it passes down the bore of the gun. When a bullet is fired



*Assistant research director, Lamp Division, Bloomfield, N. J.
†Design engineer, X-ray Division, Pittsburgh.
‡Associate physicist.

When the mad rush begins... competition will be terrific.

Wages will stay high—competition will be terrific. To remain in business and maintain full employment, manufacturers must use the most efficient machine tools obtainable. Scrap the old machines and cut production costs.

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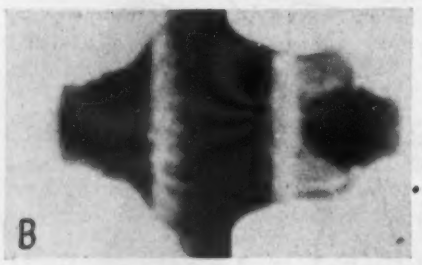
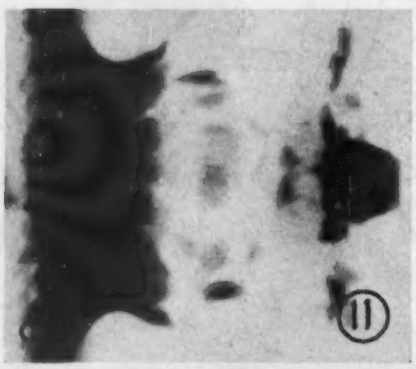
in a gun barrel, the blast which accompanies each shot reaches the muzzle before the bullet does. The top part of Fig. 14 shows a spark shadowgraph of the blast which preceded the bullet exit. This spark shadowgraph was taken at the instant a silvered glass rod placed at the muzzle of the gun was broken. The location of the bullet, still several inches from the muzzle, was determined by means of a simultaneous high speed X-ray picture, as demonstrated in top and bottom views of Fig. 14.





It has been suggested that strain gages fastened to the outside of the gun barrel at various positions along its length might be used to indicate the passage of the bullet down the bore. Some preliminary work has been carried out at the Frankford Arsenal to determine the reliability of the gages to record the position of the bullet. Excellent pictures have been obtained.

Checks Shift of Components

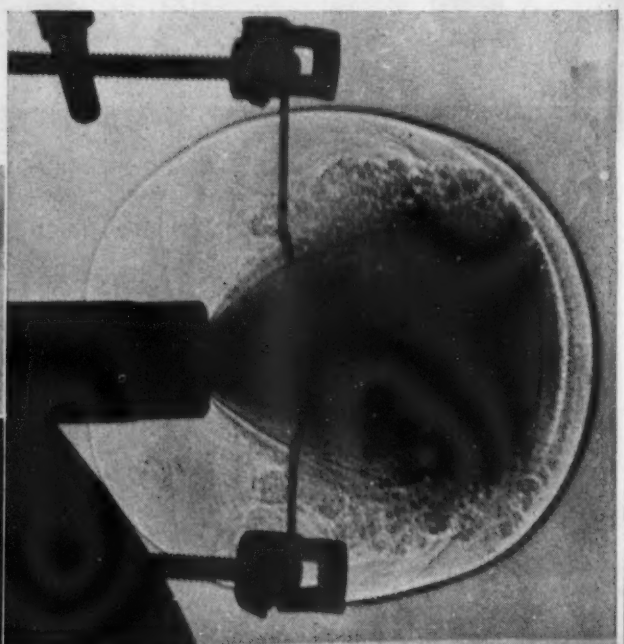
High speed X-ray equipment has been used to observe the realignment of component parts inside the bullet when it is fired. A stationary X-ray picture is taken of the bullet in question. The bullet then is fired and a high speed X-ray picture taken of this same bullet in flight. A comparison of the two X-ray pictures reveals any shift of the component parts which has taken place. This same procedure could be used, for example, to study the motion of the component parts of valves during their operation.

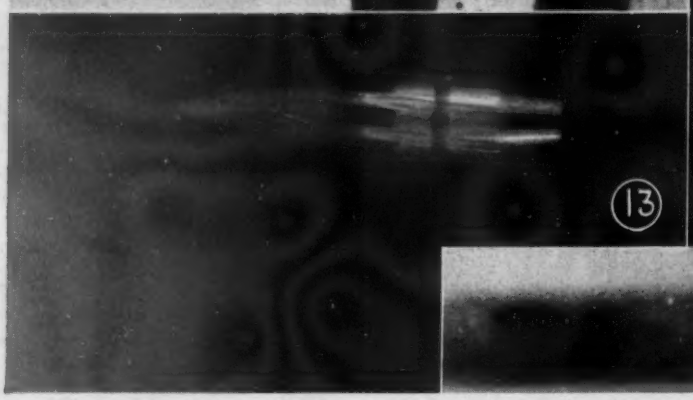
A series of high speed X-ray pictures have been taken of 20 millimeter high explosive shell passing through steel plate. It was necessary to place a steel plate ¼-in. thick over the X-ray film holder in order to protect it from the force of the explosion and the flying fragments. A new protection plate was required after every shot. Despite the fact that all the pictures were taken through ¼-in. steel, all details of the explosion are clear. One of the amazing things revealed by this study is the immense swelling of the shell to almost twice normal diameter before it finally bursts open.

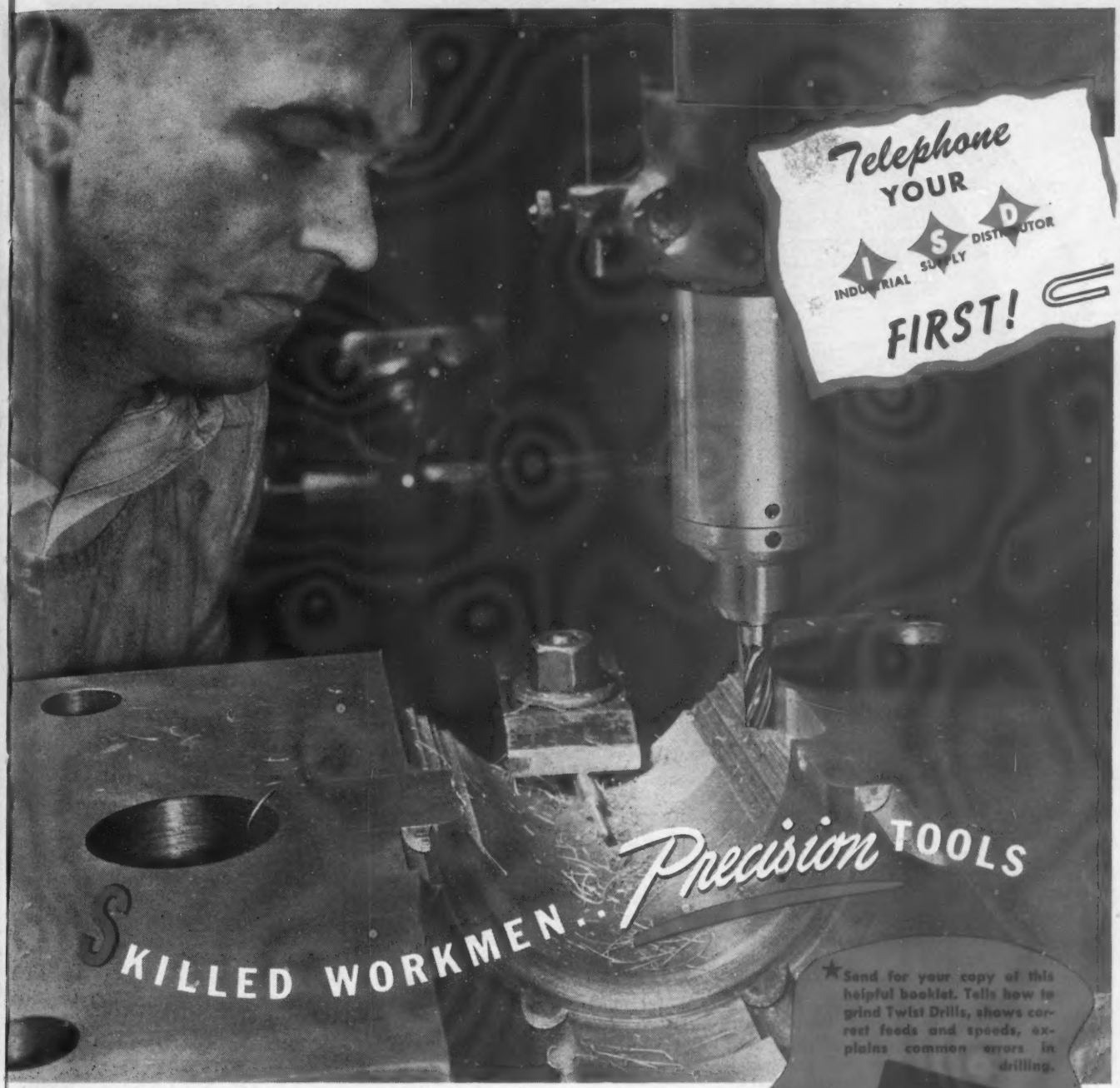
Fig. 11 shows the manner in which the shell explodes. At A-1, the nose of the shell is through the plate. At A-2, almost half of the shell is through the plate. The shell has swelled to approximately twice its normal diameter. At B, the shell has just burst open. At C, the shell is torn wide open, and the petals on the back of the plate are curling back to make a large hole. The extreme usefulness of the high speed X-ray equipment certainly is well brought out by these pictures.

A use for which the high speed X-ray equipment was not designed but for which it can be adapted readily is the taking of high speed "flash" photographs. A wire spark gap is substituted for the X-ray tube on the surge generator. The short duration, high intensity spark that results from the discharge of the surge generator can be used to take a 1/1,000,000-sec photograph of any moving object. Fig. 13 shows a 50-caliber bullet in free flight, taken in 1/1,000,000-sec on Eastman Triple X film with a lens opening of F-11. Light from the spark discharge of the surge generator was used as illumination.

Frankford Arsenal is not the only army installation using high speed X-ray equipment. The ballistics laboratory at Aberdeen has two units; several units are located on the West Coast and in Great Britain. Many other applications have been made both at Frankford and at the other locations but due to the nature of the investigations they cannot be discussed at this time. It is anticipated that this equipment will be highly useful in many other fields, including medicine, in period of peacetime just beginning.







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WESTERN STEEL PLANT OBTAINS 178 HEATS from Electric furnace roof

Ample expansion joints are provided in laying up roof lining on 40-ton electric furnaces at Pacific Coast plant. New roofs are preheated for 60 hours before installing on hot furnace. After first heat is tapped roof is cleaned and thin mixture of silimanite swept into joints. Long life of refractories is obtained

By E. G. JONES
General Superintendent
Isaacson Iron Works
Seattle, Wash.

COST of furnace refractories is an item of major importance in the maintenance of an electric steel plant and much has been said and written on this subject during the war years, all with the purpose of increasing the knowledge of how to better the life of these refractories. This is especially true in the case of larger furnace roofs which normally tend to give a shorter life than the small furnaces.

The Isaacson Iron Works, Seattle, Wash., have two 40-ton Lectromelt furnaces, basic lined using silica brick in the roofs. The furnace shell and roof ring are 15 ft diameter. Forging quality ingots of both carbon and alloy steel are produced in this plant using a two-slag process, pouring ingots weighing from 450 to 90,000 lb.

This plant was placed in operation during August of 1943 and the life of the first few roofs averaged between 25 and 30 heats. These roofs were laid up dry with 12 and 13½-in. standard shapes and considerable cutting of these brick was necessary in order to properly fit the bricks around electrode openings and in roof center. The service secured from a roof of this type depended a great deal on the skill of the brick mason and, as skill varied considerably according to the brick mason available to build the roof, it was felt that uniform results could not be obtained without the use of bricks of uniform shape. It was therefore decided to adopt, as standard, the design of roof shown in Fig. 2. The heavy dark lines shown in this sketch indicate the location of expansion joints and while allowance for expansion is perhaps slightly more than recommended by brick manufacturers, this amount has proven satisfactory and little if any spalling occurs.

An electrode opening of 19 in. is used for a 17-in. electrode. Larger openings were tried out and a slight increase in roof life resulted no doubt due to a decrease in the pressure of gasses escaping around the electrode. However the pressure in the furnace was also reduced to a point where silicon content could not be held and it was necessary to go back to the original size electrode openings.

On a continuous three shift operation new roofs are always placed on a hot furnace and bricks are subjected to

Fig. 1—Tapping a heat from one of the 40-ton furnaces at Isaacson's plant

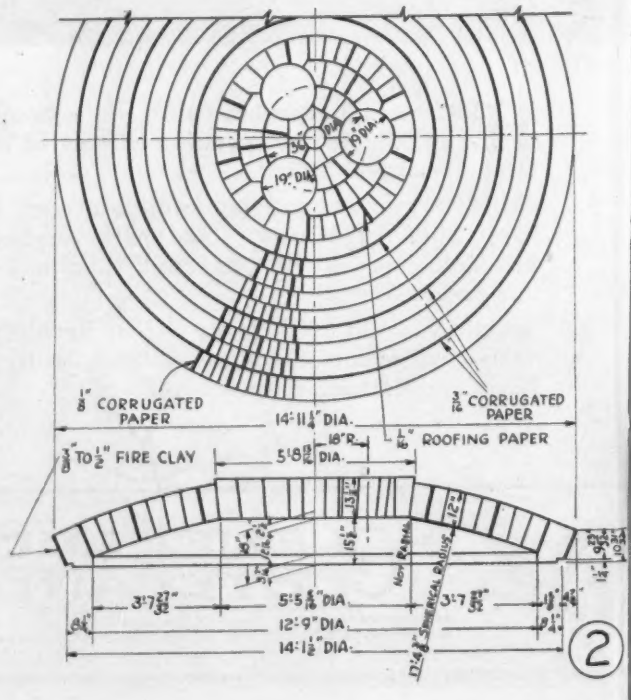
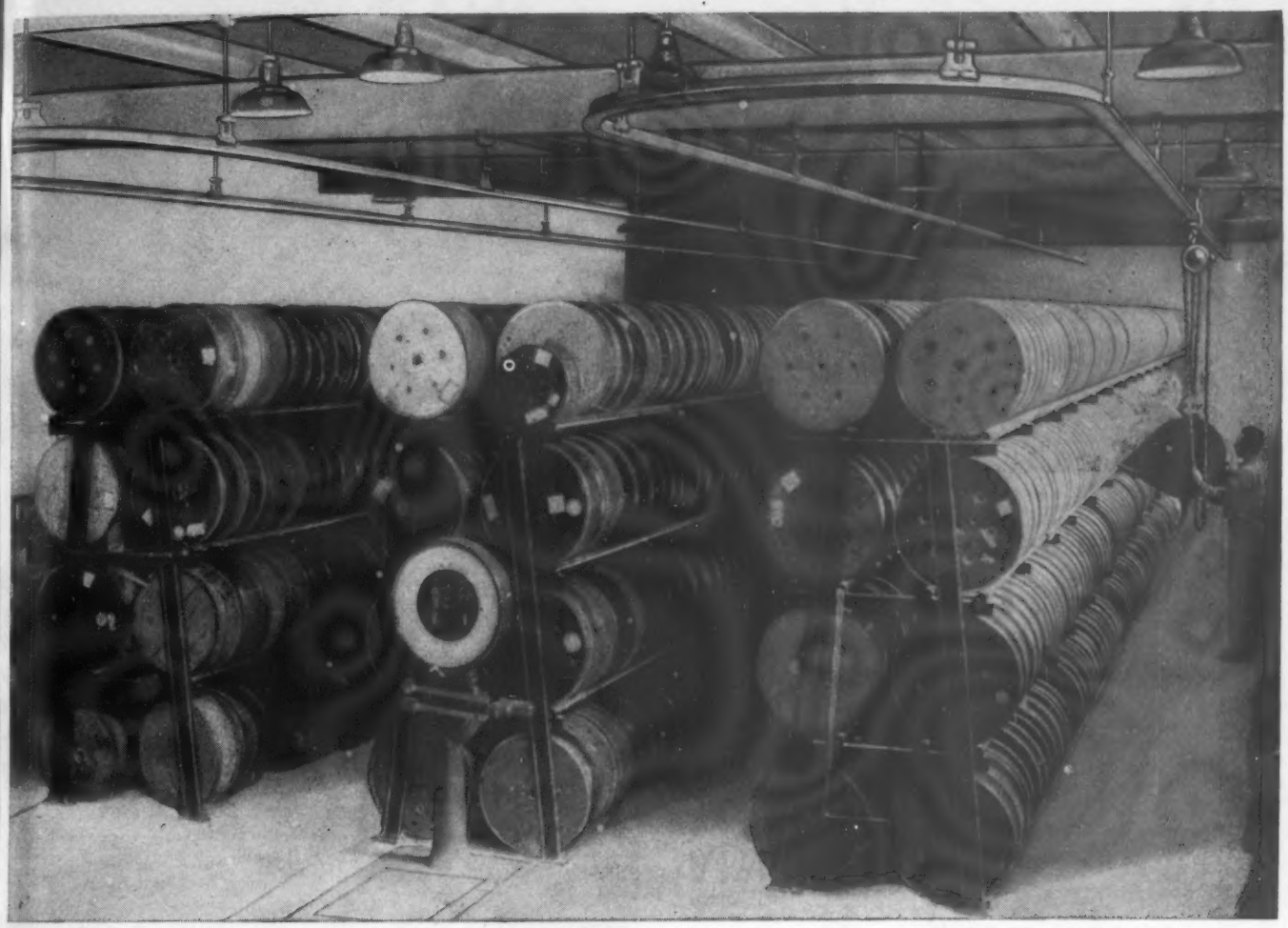


Fig. 2 — General arrangement of roof. Heavy dark lines indicate location of expansion joints



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The three racks shown above are 63 feet long and will accommodate 576 reels per row or a total of 1728 reels. This number of 24″ reels will store 300,000 pounds of wire.

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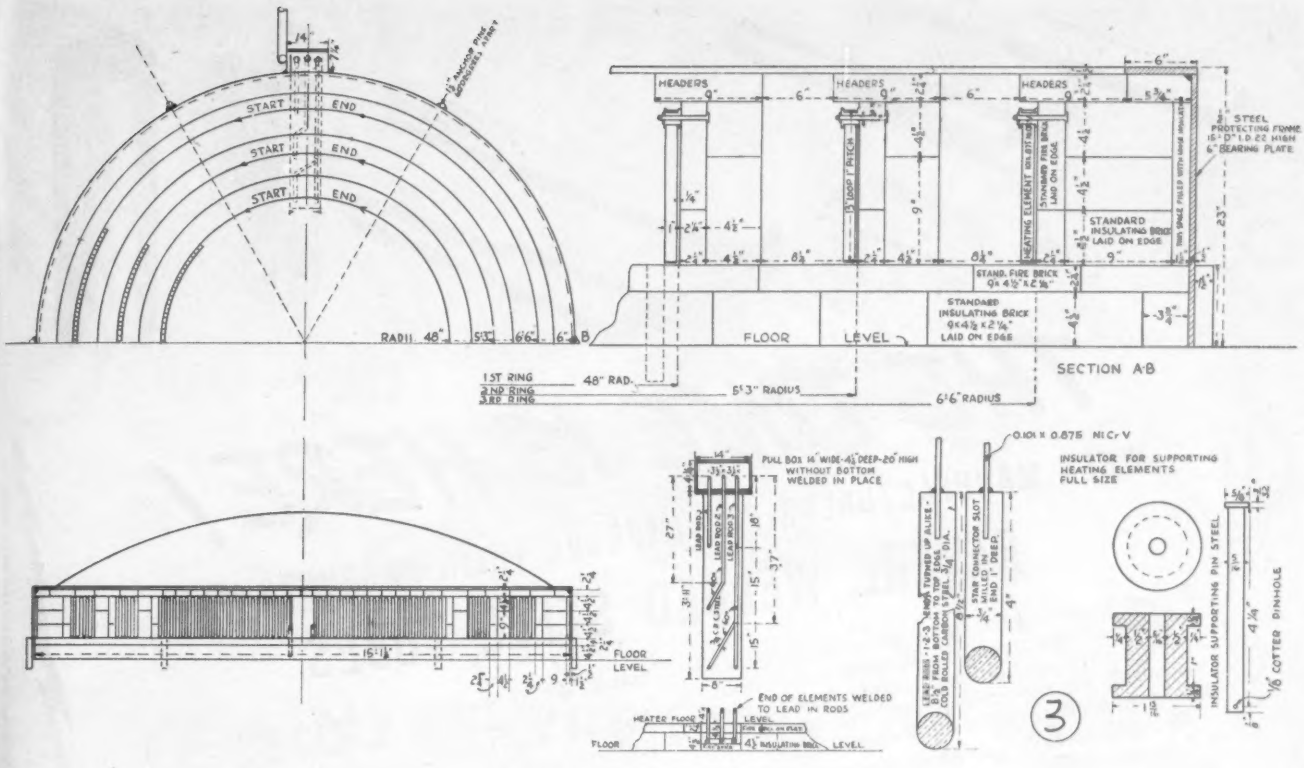


Fig. 3 — Details of automatically controlled roof preheater

high thermal stresses and considerable spalling often results during the first heat with a new roof. In order to try and correct this condition an electric heater was installed and roofs are preheated for approximately 60 hr before being put into service.

This heater is automatically controlled and the temperature is gradually brought up to 1000° F. By this time the major expansion of silica brick has taken place and the danger of spalling due to thermal shock greatly reduced. The roof heater is constructed as shown in Fig. 3. No additional floor space is required for roof heater.

Spare roofs are fully equipped with electrode cooling glands and the average time for a complete roof change is 50 min. Roof changes are made between heats, the furnace charged before the old roof is removed and power is put on until electrodes have bored well down into scrap. This has two advantages:

1—The hot electrodes are lowered far enough down so that the operator can climb onto the roof and attach the swivel pin to the electrodes without being exposed to too much heat and electrodes are removed rapidly.

2—Having bored fairly deep into the charge the new roof will not be exposed to the arc to any great extent until is has absorbed considerable temperature and thus be able to resist further expansion stresses.

The old roof is removed with one crane and the new roof is set in place by another. Thus, the preheated roof is not exposed to the air long enough to cool sufficiently as to promote spalling.

Meltdown during the first heat on a new roof is carried out rather slowly and a high voltage is avoided. As soon as the first heat is tapped all of the accumulated dust is blown off the roof and a thin mixture of silimanite cement is poured over the brick and swept into the joints. This cement fills all of the wide joints between brick and prevents hot gasses from escaping through joints and burning away the brick. The dust is blown off the roof at the end of each shift. This allows the heat to radiate through the brick in a normal manner and eliminates the buildup of temperature on the innerface of the roof.

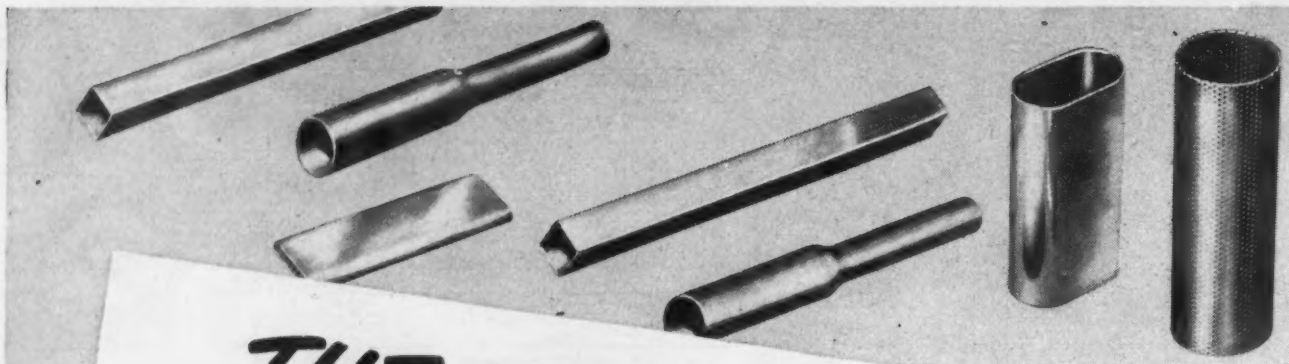
If the furnace operators are not instructed otherwise, they will usually after tapping, raise the roof 6 or 8 in. in order to allow smoke and gas to escape so that they can see to patch bottoms or banks. This may save a minute or two in patching but by so doing, a cold draft of air is pulled up off the floor and the face of the bricks are rapidly chilled and severe spalling may result.

It is preferable that the roof remain in place until ready for charging and if more than one charge is necessary the roof should be swung back into position on the furnace while the second part of the charge is being picked up. Using the highest available voltage does not always result in the fastest melting but the use of the highest voltage invariably results in the lowest refractory life. There are many factors which affect the efficiency of a meltdown and when these factors are known it is often possible to maintain high efficiency on the meltdown without the use of the highest voltage.

The furnaces at Isaacson Iron Works are equipped with 7500 kva transformers and the high voltage tap is 267 v. However, the voltage on this tap has been

BILL OF MATERIAL FOR ROOF PREHEATER

Standard firebrick, 9 x 4½ x 2¼-in., number	2400
Standard insulating brick, 9 x 4½ x 2¼-in., lbs	1300
Cold set cement, lbs.	170
Steel insulator pins, 5/16 x 4-7/32-in., number	170
Bobbin insulators, number	170
Cotter pins, number	170
Cut washers, 5/16-in., number	170
Nichrome furnace ribbon, 0.101 x 0.875-in., lbs	300
Lead rods, 3/4-in. co'd rolled carbon steel, feet	20
Steel frame: 15 ft. diam x 6-in. top x ½-in. thick, 22-in. cap, lbs	2260
Terminal box, open bottom, 14 x 7 x 20-in. high	
A. A. conduit and cover, 2-in.	
Close nipple, 2-in.	
Locknuts, 2-in.	
Bushings, 2-in.	
Iron steam tubes, 3/4 x 6-in.	
A. B. contactor and push button, size 4, No. 705	
Conduit, 2-in.	
Standard copper wire, 3/0	
Thermocouple, chromel alumel, 0 to 1500° F.	
Lindberg input controller type AA	
Foxboro indicating potentiometer controller	
Two-conductor lead wire	
Breaker and starter switch, 200 amp, 440 v, 3-pole	
Anchor pins, 1½-in. hot rolled carbon steel	



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Revere hopes that, in the conflict just ended, what we won was the gigantic opening battle for better living. To fight *this* war our nation needs materials and the products of industry on a scale even greater than that which won military victory.

One inevitable result of Revere's war effort is that not only our ability to produce, but our ability to give service, have been expanded many times. Revere research has probed further and further. Revere Technical Advisors are armed with greater knowledge and experience. New methods and new machines may save precious time or cut all-important cost.

With all these enhanced resources we are ready now to serve man's creative spirit and, by supplying industry in abundance, to help make of life the rich, joyous thing it can be.

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Fig. 4 — Exterior of furnace roof after it completed its initial campaign of 178 heats

reduced to 235 v and with the type of scrap used and the manner and method of charging, the meltdown time has been reduced by about 12 per cent by the use of the lower voltage as compared with the time taken to melt when using 267 v. The scrap does not weld together in front of the doors or on the banks as it did with the high voltage, and time is saved in pushing in.

As soon as charging has been completed the furnace is started on the low voltage tap of 140 v and held on this tap for 7 min. By this time the electrodes are sufficiently buried as to prevent the arc from splashing onto the roof face and reducing the fusion point of the silica brick by penetration of iron oxide which the arc splash carries. After 7 min on the low tap, the melting is continued on the high tap (235 v) until only a small amount of scrap is left on the banks after which the voltage is dropped to 220 v and held till the meltdown is completed.

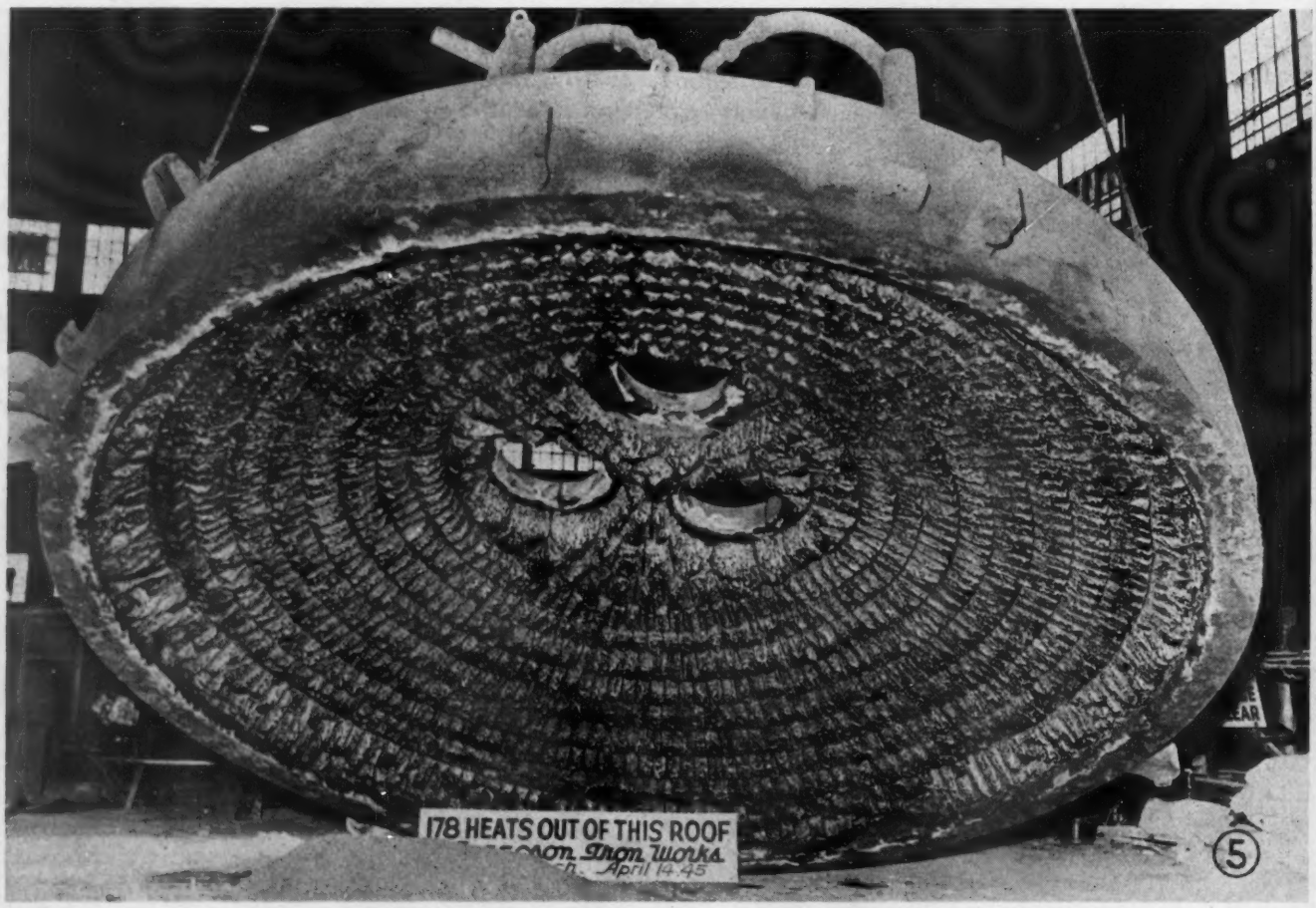
The preheater (Fig. 3) is Isaacson's own design. It has a capacity of 90 kw, is 3 phase, 60 cycle, 480 v and 109 amp per phase. A type AA Lindberg input controller and a Foxboro indicating potentiometer controller are used.

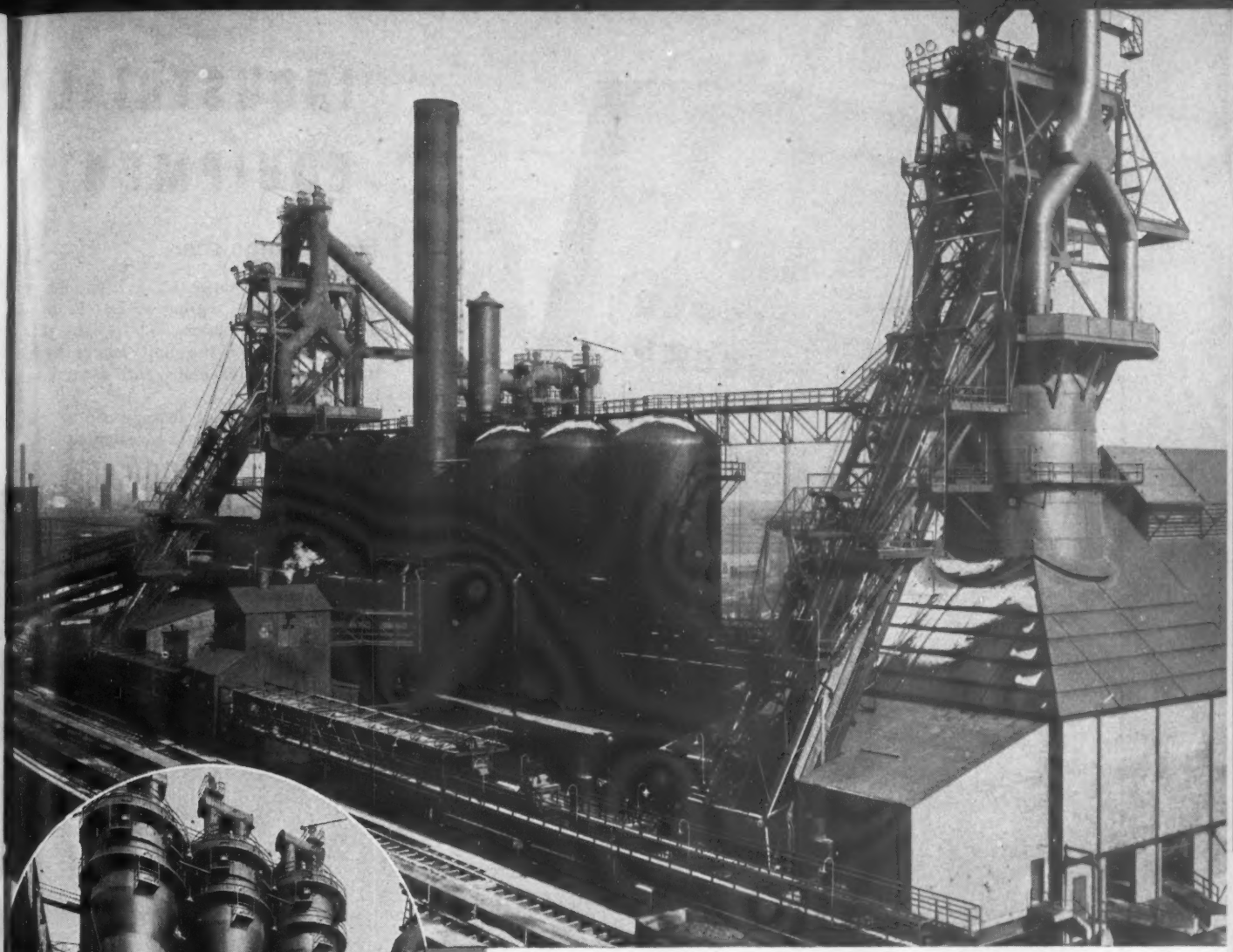
Under the foregoing conditions and methods of operation a 12-month average roof life of 110 heats was secured. However, it was evident that better life could be secured if the roof center could be made to stand up longer as most roofs failed due to the center falling in while considerable thickness of brick remained on the outer course. Therefore an attempt to strengthen the center section of the roof was made as follows: The roof was completely laid up with the exception of the centered key brick "A" and three bricks "G". See Fig. 2. These four bricks were set in place on top of a 4-in. high block. This was done so that these particular bricks could be lifted out easily after all other bricks were in place.

After all bricks were in place the four bricks left protruding were withdrawn and the 4-in. block removed and a mixture of high-temperature cement and fine silica sand mixed to the consistency of a light grout was poured into the opening left by the withdrawal of bricks "A" and "G". These openings were filled to a height of about 9 in. and the bricks were replaced and driven home. The grout was thus forced into all the voids left between bricks due to unevenness of brick surface and this retarded to a great extent the erosive action of furnace gases on the brick joints. The first roof laid up in this manner lasted for 178 heats and no patching of the roof center was required.

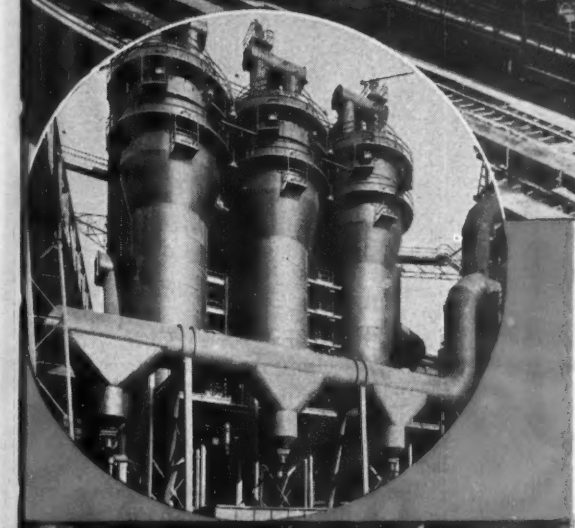
Photographs of this roof taken after it was removed from the furnace indicate that there was practically no tendency for the bricks to fail from expansion pressure and that wear was fairly uniform all the way across the roof.

Fig. 5 — Interior of furnace roof showing condition of lining after 178 heats





View of complete plant showing efficient arrangement and use of space. In Circle: Close-up of three washers with superimposed precipitators.



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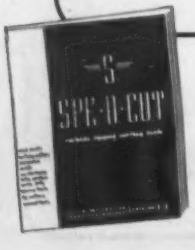

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Fire Extinguisher

A new Challenger 40 gal engine is introduced by American-La France-Foamite Corp., Elmira, N. Y. The metering feature of the unit makes foam tougher, more tenacious and more lasting.

Another important feature of the engine is its brass collar, to eliminate the danger of corroded steel threads, brazed to the shell dome inside and outside. This machine is also equipped with a Foamite shut-off nozzle similar in principle to the fire department type. The nozzle is easy to operate, works smoothly and will not stick. It contains no rubber ball to deteriorate with age.

The engine delivers 450 gal, over ten times its liquid capacity, of Firefoam in less than 3 min.

Milling Machine

A heavy duty, knee-type vertical milling machine, designed for toolroom and die sinking work, is announced by Reed-Prentice Corp., Worcester 4, Mass.

The spindle head of this miller has a tilting arrangement which allows milling at all angles within 45° front and back and within 30° left and right of the vertical. Head and transmission are mounted on a sliding ram to increase operating range. Variable spindle speeds are obtainable between approximately 90 and 2200 rpm by means of a Reeves drive. An auxiliary high speed drilling head is available with spindle speeds from 410 to 6450 rpm. The high speed head may be installed with removing standard head by swiveling it from right hand to left hand side of ram.

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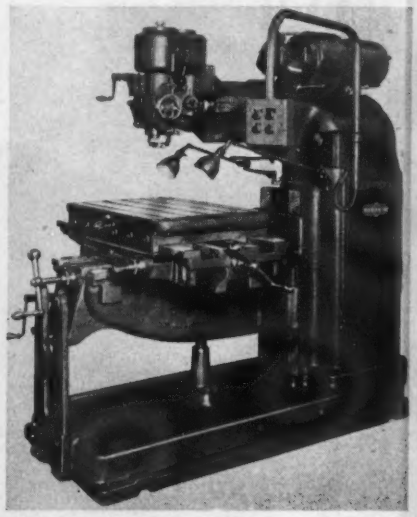
A centralized push-button control station is mounted on pendant rigid-arm,

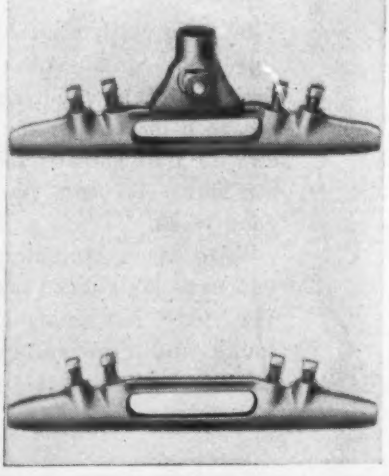


having a 90° swing, which brings the control station in easy reach of operator in any working position. The magnetic control panel and the electric unit are mounted inside the column in dust-tight compartments.

Trolley Splicer

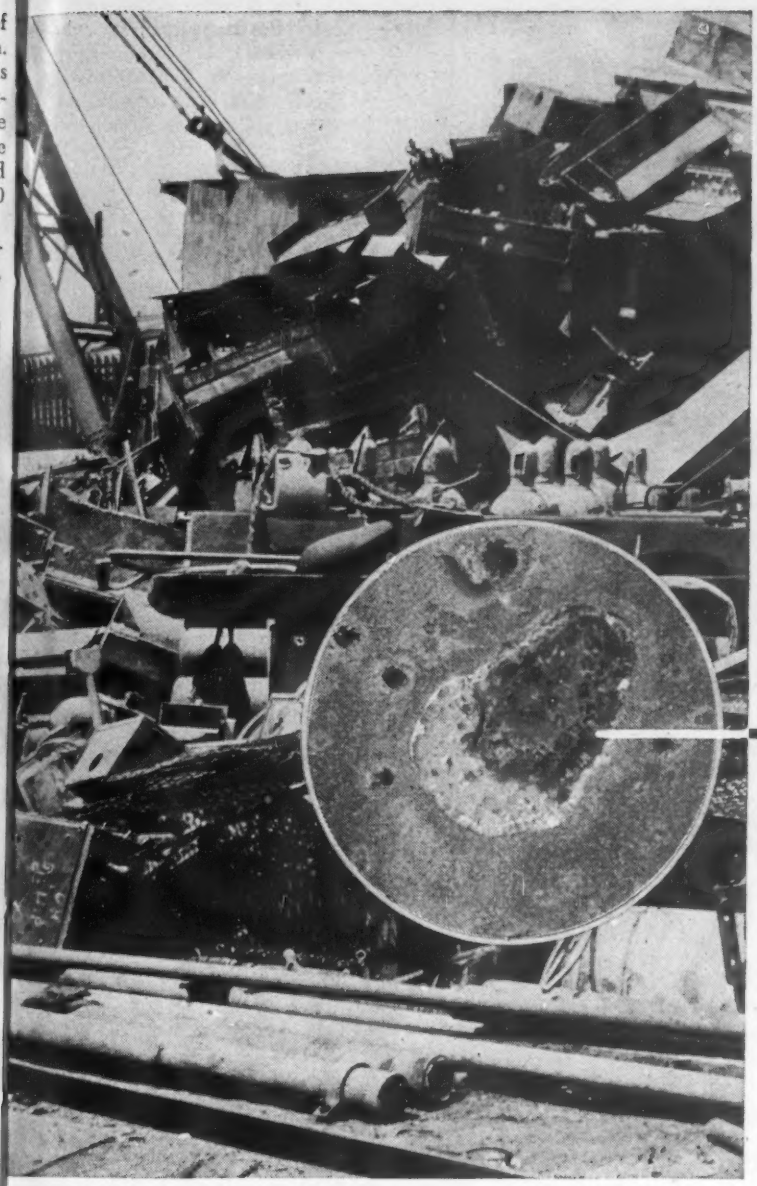
A new by-pass type of trolley splicer is announced by Mosebach Electric & Supply Co., 1170 Arlington avenue, Pittsburgh 3.

The trolley splicer can be supported



by a trolley clamp, which is attached to insulator supports, as illustrated. The clamp grips a specially designed bar which is similarly shaped to groove section of 4/0 or 6/0 trolley wire.

The splicer is equipped with knife-edge approaches so as to give a smooth



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3882 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

MANUFACTURERS AND ENGINEERS

SAND BLAST AND DUST COLLECTING EQUIPMENT, WELDING FUME COLLECTORS

A 4709-2/5-R

under run for fast moving trolley wheels. This new by-pass trolley splicer is made of Mesco bronze and is easily installed. It is available in sizes to accommodate 2/0, 4/0, 6/0 and No. 9 section trolley wires.

Lathe Toolholder

When a series of identical cuts are to be made engine lathe production operations can be speeded up with the Lane-Wells type L universal toolholder. It consists of a body which fits into the lathe tool post in the conventional manner, and detachable heads which hold standard high speed or carbide tipped tool bits.

These attachments are made in four sizes to fit any engine lathe from 9 to 36 in. swing. Once the body is fastened

in the tool post and bits adjusted in the detachable heads, it requires less than 3 sec to change from one tool to another. Eleven different standard heads are available for turning, facing, forming, drilling, reaming, tapping, etc. Special operation heads can be made from the standard blanks.

The toolholder is manufactured by Lane-Wells Co., 5670 South Soto street, Los Angeles 11.

Connector Strip

Solderless connector strips, manufactured by Aircraft-Marine Products Inc., 1591J North Fourth Street, Harrisburg, Pa., incorporate the company's knife-switch disconnect terminal design. The permanent disconnect member of the splice has an extended tongue which fits snugly into the connector strip. This member terminates in a knife-switch stamping to which any terminal of the knife-switch design may be readily connected or disconnected by holding the free terminal end vertically in contact with the strip member and then pulling back. The resulting connection is a four-point contact giving maximum electrical and mechanical service performance.

Two types of connectors are available. The single-width strip is for use with

COOLING OFF HOT DIPS

Another result of industrial refrigeration

WHEN a fighter pilot dips in for the deck, he's coming in hot . . . plenty fast . . . he either cools off speed with wing flaps *down* . . . or, he's heading for trouble . . .

And the electrolyte in which aluminum—for wing flaps or window sash—is dipped must be cooled off, too . . . or, there's trouble ahead.

In anodizing aluminum or aluminum alloys, the uniformity of the thin 1/10,000th inch oxide film . . . its toughness . . . corrosion- and abrasion-resistance . . . strength of primer paint bond . . . are all dependent, in large measure, on *controlling* bath temperature.

So, here's another important job for G-E Condensing Units! Preventing the electrolyte in anodizing tanks from reaching excessively high temperatures.

And *cooling off hot dips* . . . in many a chemical or metallurgical process . . . means smoother, more economical, more efficient production . . . with fewer bugs popping up to plague operating engineers and management executives.

G-E Condensing Units can be counted on to do a *quality* job . . . to respond to close, automatic temperature control for any liquid. So, if the problem of cooling a fluid is facing you now . . . or is listed among your postwar projects . . . *turn to G-E!*

Our specialized engineering techniques . . . industrial refrigeration and air conditioning experience, skills and research are at your service. You can tap this source—without obligation—by simply writing:

General Electric Company, Air Conditioning Department, Section 5459, Bloomfield, New Jersey.

☆ ☆ ☆

BUY . . . and hold . . . WAR BONDS

GENERAL ELECTRIC

Industrial Refrigeration

Tune in: The "G-E HOUSE PARTY," every afternoon, Monday through Friday, 4 p. m., E W T, C B S . . . The "G-E ALL-GIRL ORCHESTRA," Sundays, 10 p. m., E W T, N B C . . . "THE WORLD TODAY" News, Monday through Friday, 6:45 p. m., E W T, C B S

IRCO PRODUCTS
CONQUER RUST
THE
WORLD OVER

Rustarest Aluminum Paint

designed for your specific requirement

TWO-FOLD PROTECTION

RUSTAREST ALUMINUM PAINT is designed to embody the most effective protection against rust or corrosion. In addition to the metal armor protection the aluminum pigment forms, the RUSTAREST vehicle contains special rust inhibiting and neutralizing qualities. The combination of the finest aluminum pigment plus RUSTAREST insures the maximum protection for both heated and cold metal surfaces.

DURABILITY AND MOISTURE RESISTANCE

Aluminum paint is durable because the metal flakes are opaque to light and impervious to moisture. All drying oils are adversely effected by sunlight, continuous exposure to sunlight injures a film unless it is protected by suitable pigments. The flaking and laminated structure of aluminum paint assures protection to the binder. RUSTAREST ALUMINUM PAINT films, because of its flaking structure, also protect surfaces against moisture penetration. The arrangement of the flakes in the film forces moisture to follow a much longer path around and between the innumerable flakes. This is equivalent to multiplying the film thickness several times. When it is remembered that the RUSTAREST vehicle is in itself highly resistant to moisture passage it becomes evident why RUSTAREST ALUMINUM PAINT is superior to most other types of coating.

REFLECTIVITY AND HIDING POWER

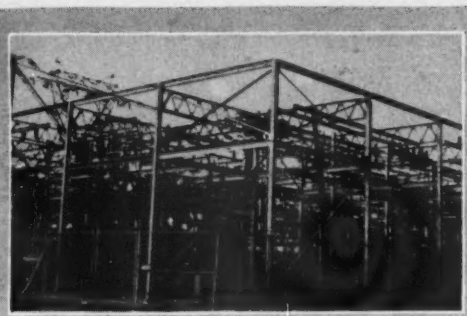
RUSTAREST ALUMINUM PAINT reflects between 60-75% of light and radiant heat falling upon the surface.

It helps insulate structures and keeps the interior at lower temperature. It increases visibility of bridges, towers and water tanks. It improves lighting efficiency on dark interiors and by reflecting instead of absorbing radiant energy it protects the vehicle and gives it longer life.

RUSTAREST ALUMINUM PAINT film if only .0005 of an inch thick, uniformly applied will hide and cover any colored surface; since the average thickness is twice this value the paint develops its maximum reflectivity in a single coat.

WEIGHT

A gallon of aluminum paint weighs a little over 8 pounds. This is less than half the weight of common paints thus making it easy to apply. The dried film is approximately 5.5 pounds per gallon. This factor is of some importance where saving in the weight is desired.



FOR ALL KI OF STRUCTUR STEEL

Also for me posts, lamp ports and fini Metal roofs buildings.

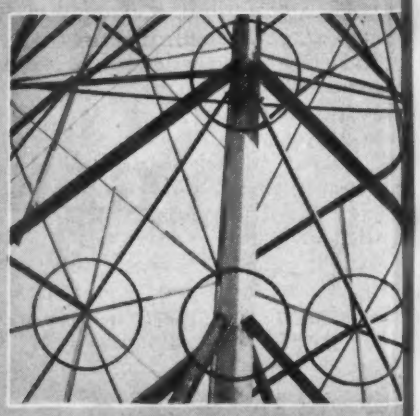
CHAIN LINK FENCES

It penetrates between the wires and is not effected by constant flexing.

MARKS SHOW PORTIONS WHERE DAMAG OCCURS

The ideal treatment for towers is a complete 'pr coat of RUSTAREST NO. 10A and aluminum.

The next best is to spot joints and rusted portions RUSTAREST NO. 10 and then apply complete coat RUSTAREST NO. 10A and aluminum.



WHERE RUSTAREST ALUMINUM PAINT CAN BE USED

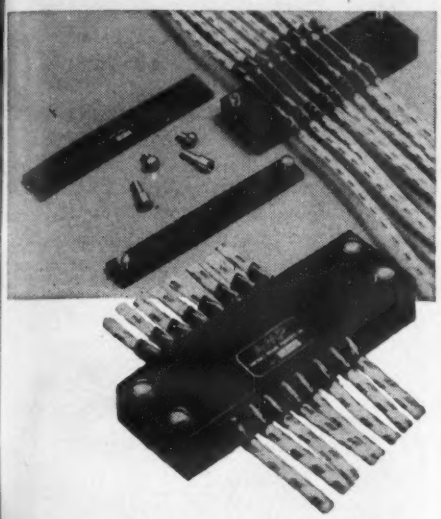
Steel Bridges	Water Tanks
Sheet Metal	Galvanized Iron
Gas Tanks	Trucks
Production Spraying	Corrugated Metal
Steel Frames	Ships
Wire Fences	Roofs
Flashings	Piping
Air Ducts	Transmission Towers
Ventilators	Steel Stacks
Structural Trusses	Crane Run-Ways
Frames	Railings
Ship Interiors	Mine Equipment
Boiler Fire Doors	Dust Collectors

INTERNATIONAL RUSTPROOF CORPORATION

12507-15 PLOVER AVENUE CLEVELAND, OHIO

For further information write for literatur

the AMP pre-insulated splicing terminal which requires no insulation sleeving. The knife-switch part of the permanent member extends outside the strip and connection and disconnection is made without removing the cover of the assembly. The double-width strip has the disconnect ends enclosed, locked and insulated by the cover one-half of which

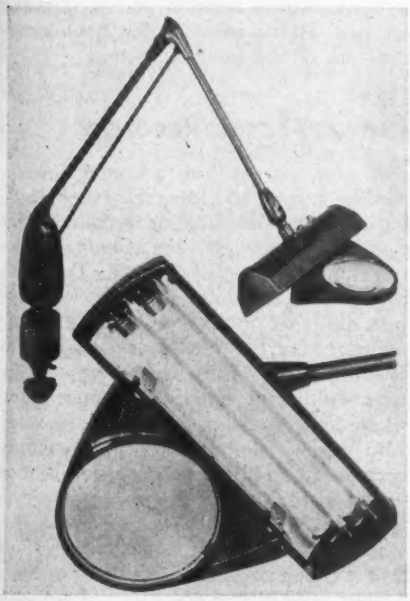


is independent of the other half Disconnection is made by unscrewing only one half of the cover to expose the connections.

Stacking screws with threaded heads make it possible to permanently stack a series of AMP strips with the cover screwed on top. The strips may be specified to accommodate any desired number of connections.

Lighting Device

An adaption of Super Sight magnification to fluorescent lighting is announced by Safety Division of Boyer-



Campbell Co., 6540 St. Antoine street, Detroit 2. Where magnification is used continuously, the cool fluorescent lighting add to comfort of operator. Super

CURTIS Dependability Scores Again

Giant Army Dredge Relies on Curtis Compressor to Start 320 H.P. Diesel

This new ASD Hydraulic Dredge, built by American Steel Dredge Company for the U. S. A. Engineer Corps, is designed to operate in isolated locations for long periods. Its power plant cannot fail.

A Curtis Air Compressor maintains a minimum of 200 lbs. pressure in a large air storage tank, used to start the main Diesel Engine which is directly connected to the dredging pump.

Here's but another example of the recognition accorded Curtis equipment. For years Curtis has set the highest standards and performance records for economical dependability throughout a long, trouble-free life. Here are some reasons why:

✓ TAPERED ROLLER BEARINGS ✓ CARBON-FREE DISC VALVES
✓ CENTRO-RING LUBRICATION ✓ AUTOMATIC PRESSURE UNLOADER
✓ PRECISION CONSTRUCTION THROUGHOUT

Write for our bulletin, Form C-4-C.

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of Curtis Manufacturing Company
1996 Kienlen Avenue, St. Louis 20, Missouri

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EUCLID *Cranes*

WE CAN DELIVER
a limited number of 5 to 10 ton cranes in 60 to 90 days

This type of Euclid Crane is ideal for many industries.

Convenient floor controls permit it to be operated skillfully by any of the several men working on the floor. They get the necessary "lift" instantly whether it be a speedy movement of material, or the precision of control required in modern foundry work, the placing of parts in machine tools, or the final assembly of finished parts. This saves valuable time and increases the output of each man-hour.

Euclid Cranes and Hoists don't have to be pampered. They embody safeguards against all contingencies and are as nearly "fool-proof" as it is possible to build. Above all they are products of quality that prove to be the cheapest to operate and maintain in the long run.

THE EUCLID CRANE & HOIST CO.
1365 CHARDON RD. • EUCLID, OHIO

Sight is now supplied in three types of lighting: Standard bayonet type of bulbs; lamps that are sealed to relieve explosive hazard; fluorescent lamp.

It is supplied with three types of brackets and two sizes of lenses.

Chucks

Monarch Governor Co., 1832 West Bethune avenue, Detroit 6, announces Model J-10A Jiffy Jig chuck for use in vertical setup position. Except for the bracket that allows for horizontal setups, this new model includes all features of Model J-10 and is adaptable to various machine tools for drilling, milling, grinding, boring, etc. The chucks are designed to provide ample chip clearance and when the chuck is either open or closed, collet has absolute zero

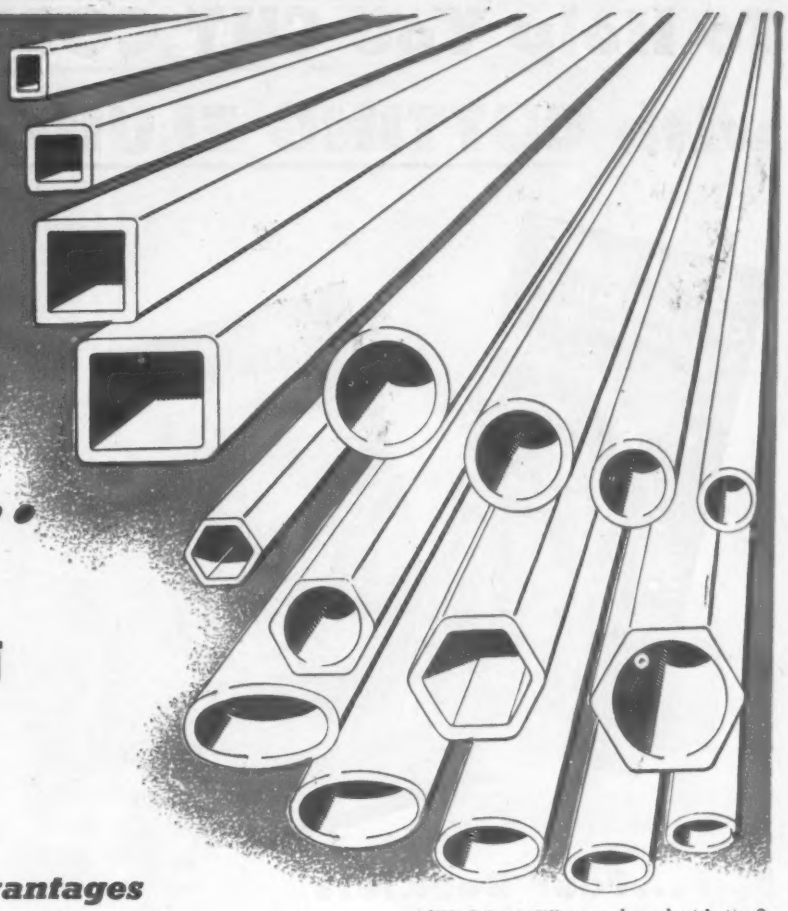
axial and rotary movement, positive axial and rotary dimensional control. The device consists of a cap, base and an operating lever, the taper on cap conforming to that of collet. With proper sized collet in place, cap is screwed down on base until collet opens and closes as desired; operating lever is then screwed into convenient location and it is ready for use. It has capacity for stock ranging from $\frac{1}{16}$ to 1 in. cross section.

Current-Force Recorder

A new current-force recorder for recording current and force resistance welding machine electrodes is announced by Special Products Division, General Electric Co., Schenectady, N. Y. Desirable for use in welding research and for periodic checking of welding machine performance, the device is designed to be helpful to users of energy-storage type welding machines for determining when forge pressure is applied to work with respect to discharge of welding current. In addition, it permits resistance welding machine users to comply with Navy Specifications, Navaer PW-6A, Bureau of Aeronautics, specifications for spot welding of aluminum alloy, for class A spot welding.

Compact and portable, recorder consists of an amplifier-oscillograph unit and a special electrode holder. Amplifier-oscillograph unit, which operates from a

How UP-TO-DATE Are You On ALUMINUM?



Coming...

Precision-Processed Tubing to Reduce Postwar Production Costs!...

... many other important advantages

WHAT A LOT OF HEADACHES go out the window the moment you specify Reynolds Aluminum Tubing!

Extruded—and therefore seamless—it lives up to every performance test. In addition, since it is precision-processed to close tolerances, it comes to you exact in every dimension—length, weight, inside and outside diameters.

And finally, each shipment is carefully labeled, wrapped, packed in boxes . . . ready to go into production without further checking.

Whatever you make (actually, there seems almost no limit), you'll be able to order Reynolds Aluminum Tubing in the proper length size, temper, and alloy to help you save time, manpower, floor space, tools—reduce your metal inventory . . . increase production, decrease costs!

CONSIDER ALUMINUM . . . Consider the added efficiency and economy of the new high-strength Reynolds Aluminum alloys. Consider light weight, corrosion-resistance . . . resistance to shock . . . thermal and electrical conductivity . . . non-sparking qualities . . . chemical stability, non-toxicity, color and taste protection. Consider also ease of fabrication and assembly, lower price trends. And, finally, consider Reynolds nation-wide production and service facilities. Reynolds Metals Company, Aluminum Division, 2520 South Third Street, Louisville 1, Kentucky. Consider Aluminum . . . **CONSULT REYNOLDS**

LIKE TO MAKE a good product better? Reynolds technicians will gladly work with your engineers. Offices in principal cities. Phone nearest office or write Reynolds Metals Company, Aluminum Division, 2500 South Third Street, Louisville 1, Kentucky.

UPON REQUEST! Bulletin 17-B, Tubing . . . Bulletin 22-B, Sheet and Strip. For Wire, Rod and Bar, see Bulletin 31-B . . . Extruded Aluminum Shapes, Bulletin 35-B. And don't forget Catalog 100-A. "Reynolds Aluminum. Its Important Role in Tomorrow's Products."

7806-A1-7

REYNOLDS METALS

REYNOLDS

The Great New Source of **ALUMINUM**

INGOT • SHEET • SHAPES • WIRE • ROD • BAR • TUBING • PARTS • FORGINGS • CASTINGS • FOIL • POWDER

To Help You CUT COSTS with CUTTING FLUIDS...

...Four Booklets

Machining costs come down and machining quality improves when cutting fluids are selected and used scientifically. To help you use cutting fluids to better advantage, D. A. Stuart Oil Co has available four pocket-size booklets full of information gathered from over eighty years experience.

1. Cutting Fluids for Better Machining. A comprehensive 60-page hand-book on cutting and grinding fluids. Contains much data on general machining as well as oils.

2. Grinding with Oil. Deals with the use of oils for production, precision grinding.

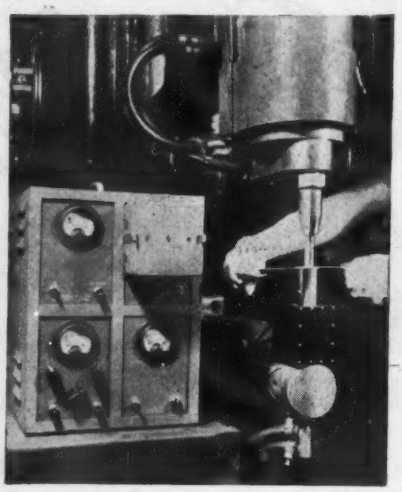
3. The 577th Oil. Contains twenty-two case studies showing results of proper oil application.

4. Water-Mixed Cutting Fluids. A new booklet which explains the "how" and "why" of so-called "soluble oils" and gives many tips on how to handle them.

These booklets are yours for the asking. Indicate by number which you are interested in. *D. A. Stuart Oil Co. Limited, 2735½ S. Troy St., Chicago 23, Illinois.*

D. A. Stuart Oil Co.
LIMITED
ESTABLISHED 1865
Stocks in Principal Metal-Working Centers

115-v, single phase, 60-cycle power source, is composed of a single channel amplifier, an oscillator, a power unit, and a small magnetic oscillograph, all housed in a metal case. This unit simultaneously records a timing wave, rapidly changing electrode force and electrode current of welding machine while a weld is being made. Record produced by recorder also indicates squeeze time, duration and magnitude of welding current, rate of rise of forge pressure and hold time. The electrode holder is equipped with strain gages for measuring compressive strain, which is a measure of force in the electrode and a built-in shunt for diverting



from electrode a proportional amount of current, which is used to operate an oscillograph galvanometer.

In operation, a 5000-cycle voltage from the oscillator is applied to two points on strain gage bridge circuit and output from two opposite points is a measure of force on electrodes. The output of the bridge is fed into amplifier which amplifies the modulated carrier and rectifies and filters the amplified output. Output is then fed to oscillograph where record is made. Welding current and a 60-cycle timing wave are recorded simultaneously on the 3½-in. paper record.

Vacuum Tube Voltmeter

The televiso series 200A VT voltmeter for voltage measurements within the range of 7 cps to 500 megacycles are available.

Five voltage ranges are provided—0.5, 2, 15, 50, 150—spread full scale on a 4½ in. meter dial. Lowest readable voltage is 0.05 v on a maximum scale range of 0.5 v. Accuracy of readings are 2 per cent full scale; middle scale accuracy is 5 per cent or more.

Aluminum panel and dural cabinet are ¼-in. thick, sub-chassis is ⅛-in. thick and is spaced off panel by studs to simplify servicing. Size of the unit is 14 x 9½ x 7½ in.

Series 200A utilizes no diode input tube. Plate circuit rectifier type makes available higher input impedance at all frequencies. No shorting of input probe is required for zero adjustments. Adjust-

"ALLCASTEEL" SHEAVES
BULLETIN No. A-396
Pouring open hearth steel into the mold for a 12-ft. diam. sheave wheel at the Vulcan foundry. The ladle holds approximately 30,000 lbs. of molten steel when it leaves the furnace so that a number of molds can be poured in quick succession—each mold requiring only a few minutes.
FOR nearly a quarter of a century the Vulcan Iron Works has been manufacturing a different and better type of sheave wheel—cast in one piece from .40 carbon open-hearth steel and carefully heat-treated to secure the best combination of toughness and hardness throughout its entire structure. Long previous experience in the manufacture of old-style "bicycle" sheaves had convinced us that one-piece cast-steel sheaves were the only adequate answer to this important problem, and when our present large steel foundry was completed, soon after the first world war, we lost no time in beginning their manufacture.
Highly-Developed Foundry Practice Produces Uniformly Perfect Castings
When the manufacture of large-diameter Vulcan "Allcasteel" sheaves was first undertaken the same difficulties were encountered which had discouraged other steel foundries, and which had always been considered inevitable in the casting of large circular
'Allcasteel" Sheave on boring mill in Vulcan machine shop.
objects of any kind having a relatively small cross-sectional area. Eventually, however, a highly specialized method of molding, gating and pouring was developed, which—combined with
Page 4
VULCAN IRON WORKS
WILKES-BARRE, PA., U.S.A.
'Allcasteel" Sheaves, equipped with tapered roller bearings in hubs and grooved for 1¼" rope.
IMPORTANT OPERATING ADVANTAGES
Either of these conditions can ruin an expensive wire rope in a relatively short time and your surest protection is the use of Vulcan "Allcasteel" Sheaves. Rope grooves are always of correct size and shape—alignment and balance are always practically perfect—and every sheave carries a positive guarantee against any harmful amount of wear in the rope-groove under normal operating conditions.
Close-up of Vulcan "Allcasteel" Sheave showing how outer races of tapered roller bearings are pressed into hub. Illustration on page 7 shows bearings mounted on shaft.
Page 5
VULCAN
ALLCASTEEL
SHEAVES
PROLONG THE WORKING LIFE OF WIRE ROPE
Vulcan Iron Works, Wilkes-Barre, Pa., U.S.A.
Bulletin No. A-396
24 Large Pages
Fully Illustrated

If You Use Wire Rope You Need This New Bulletin on

MODERN MONEY-SAVING SHEAVE WHEELS

It tells why thousands of old "bicycle-type" sheave wheels now in operation have outlived their usefulness—why their defective alignment and worn-out grooves are chewing up expensive rope needlessly—why their excessive weight increases mass inertia, rope friction and power costs.

But there's a brighter side to the picture. It also tells why Vulcan Allcasteel Sheaves are light in weight yet extremely strong and tough—why their original perfect balance and accurate alignment never change—why their smooth hard groove-surface resists wear; thereby prolonging the useful life of wire rope—reducing lubrication and power costs—promoting safe operation.

This sheave-wheel bulletin is different from any that you ever saw before—packed full of engineering data and other useful information relating to the selection and operation of sheaves and wire rope, yet interesting and easy to read throughout. Write for Bulletin No. A-396 today. No charge or obligation.

VULCAN IRON WORKS

Established 1849

Main Office and Works **WILKES-BARRE, PA.,** New York Office 50 Church

Heavy-Duty Electric Hoists
Self-Contained Hoists
Scraper Hoists
Car-Spotting Hoists
Room Hoists

Shaking-Chute Conveyors
Chain Conveyors
Cast-Steel Sheaves and Gears
Cages, Skips and Gunboats
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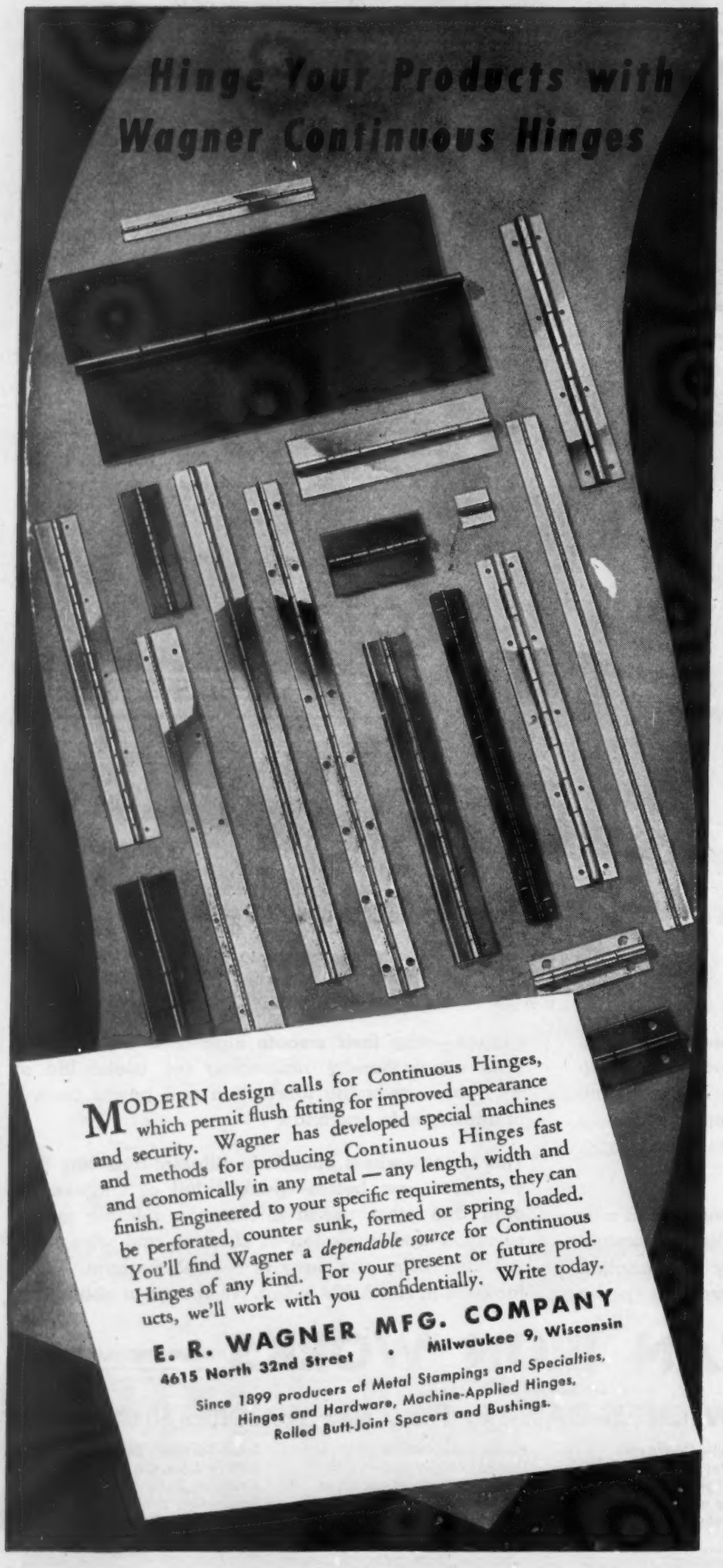
geared and electric drive
Gasoline Locomotives
geared and electric drive

Load-Carrying Larries
Rotary Kilns, Coolers and Dryers
Crushing Rolls and Pulverizers
Briquetting Machines
Ball, Rod and Tube Mills


Hinge Your Products with
Wagner Continuous Hinges
MODERN design calls for Continuous Hinges, which permit flush fitting for improved appearance and security. Wagner has developed special machines and methods for producing Continuous Hinges fast and economically in any metal — any length, width and finish. Engineered to your specific requirements, they can be perforated, counter sunk, formed or spring loaded. You'll find Wagner a *dependable source* for Continuous Hinges of any kind. For your present or future products, we'll work with you confidentially. Write today.
E. R. WAGNER MFG. COMPANY
4615 North 32nd Street • Milwaukee 9, Wisconsin
Since 1899 producers of Metal Stampings and Specialties, Hinges and Hardware, Machine-Applied Hinges, Rolled Butt-Joint Spacers and Bushings.

ments for zero are made once and remain constant. Filament and plate voltages are transformer and tube regulated. Built-in calibration voltage is provided.

The series 200A will operate satisfactorily from any source of voltage from

95 to 130 v ac. Line voltage surges are not observable during use. This unit is manufactured by Televiso Products Inc., 7466 Irving Park road, Chicago 34.

Light Duty Clamp

Designated as Model KV-210, a light duty, toggle-action clamp is introduced by Knu-Vise Inc., Detroit 16 for holding parts for inspecting, grinding and other mechanical processes. The clamp has a long handle for extra leverage and the toggle bar can be reduced in length for mounting close to work to achieve increased holding power.

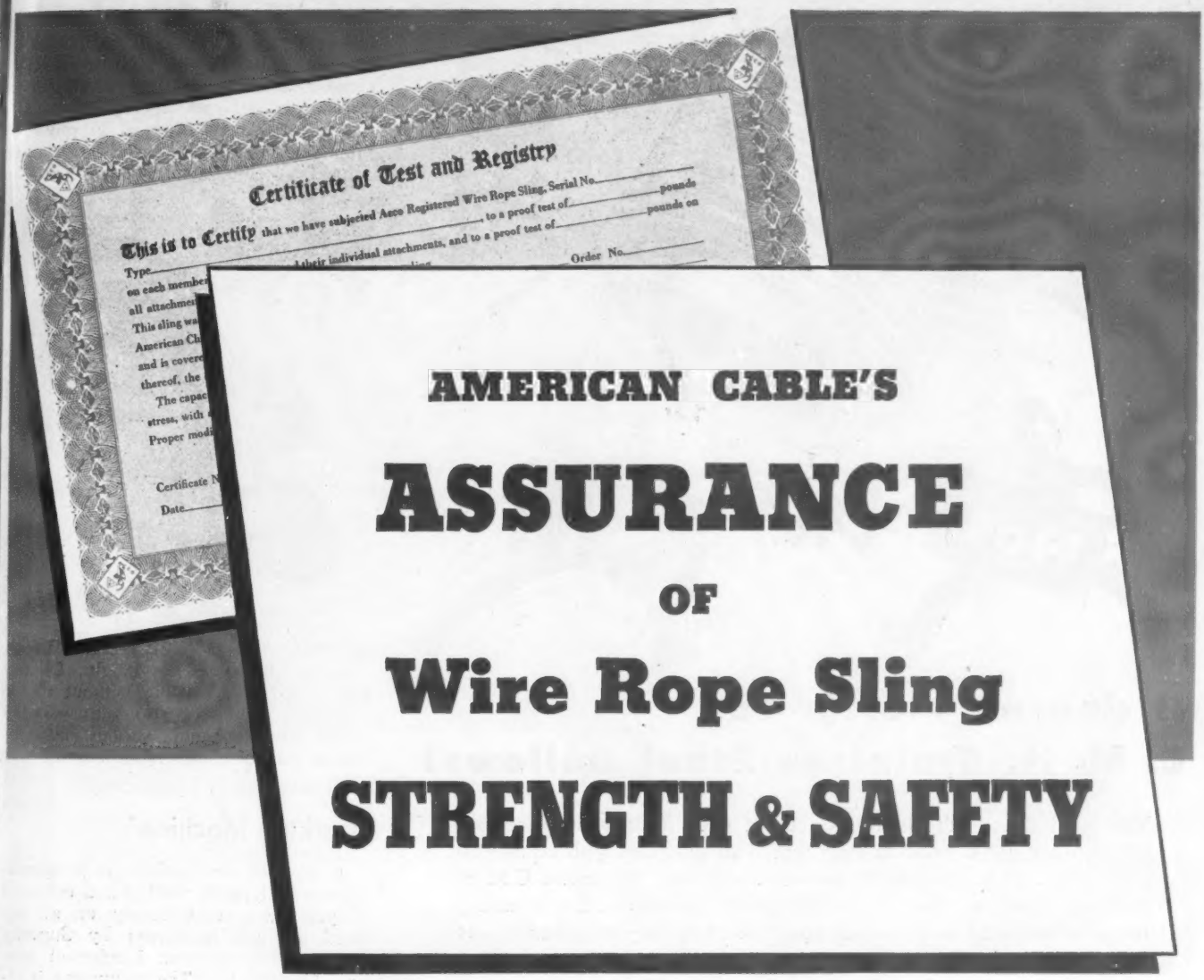
Bar can be used for making direct clamping to work or it can be equipped with a spindle held by a standard bolt retainer welded to the end of the bar.

All parts, except toggle bar, are heat treated, and the entire clamp is cadmium plated. It measures 7⅛-in. in height and 6⅜-in. in length, and weighs 24 oz. The recommended load at end of the toggle bar is 240 lb.

Tablet Compressing Machine

An improved Eureka tablet compressing machine is offered by F. J. Stokes Machine Co., Philadelphia 20, Pa. Improvements include a more efficient feeding device for handling materials difficult to feed; frame has been strengthened; ejection cam is now milled to give smoother action; and an improved adjustment of lower plunger enables press to make very small tablets.

Applying pressure of 1½ tons, with a maximum die-fill of 7/16-in. and producing tablets up to ½-in. diameter at rates up to 100 per minute, this press has many applications in experimental


Certificate of Test and Registry
This is to Certify that we have subjected Acco Registered Wire Rope Sling, Serial No.
to a proof test of pounds
their individual attachments, and to a proof test of pounds on
Order No.

AMERICAN CABLE'S

ASSURANCE

OF

Wire Rope Sling

STRENGTH & SAFETY

● Now you may have registered assurance—a Certificate of Test and Registry—with your wire rope sling.

American Cable proof-tests every Registered Sling to twice its rated capacity. Then, as proof of known strength and safety, you may have your sling **ACCO-Registered** and receive a Certificate showing the actual proof-test load, maximum safe load and date of testing. Only the highest grade wire rope (TRU•LAY Preformed of Improved Plow Steel) is used to make American Cable's **ACCO-Registered Slings.**

ACCO-Registered Service helps you select the right sling for your particular job; then registers and identifies its pre-determined strength. Send today for your free copy of the book on **ACCO-Registered Sling** Service.

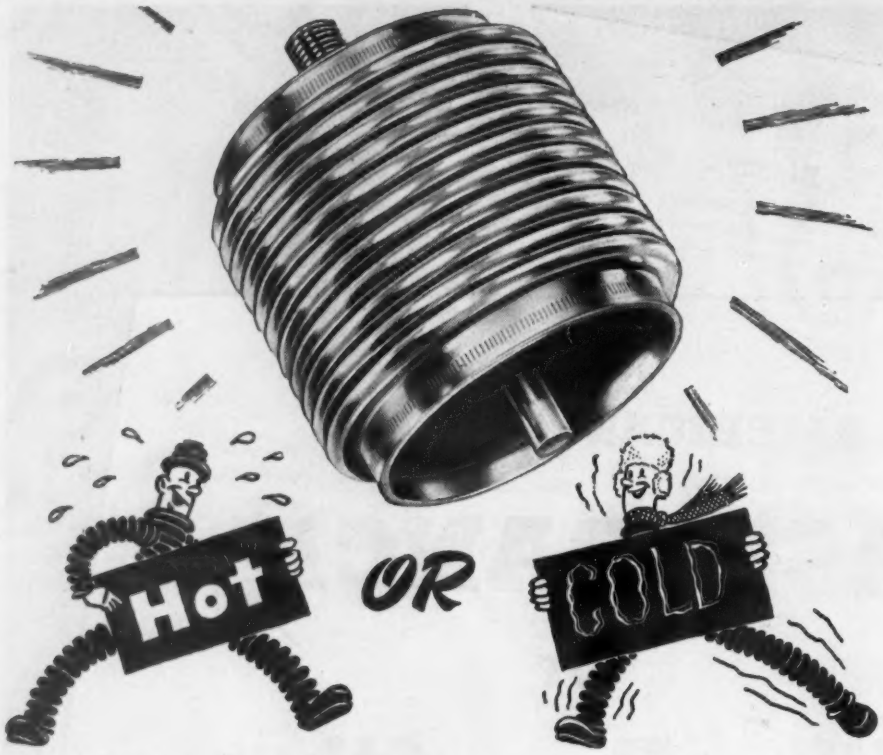
ACCO

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Bridgeport, Conn.

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety



It doesn't matter to C. M. H. Stainless Steel Bellows!

You can't choose the temperatures of each bellows application, but you *can* use a product engineered to perform with equal efficiency . . . at both ends of the thermometer! We mean C.M.H. Bellows, made of 18-8 Austenitic *Stainless Steel,* with a working range of sub-zero to a scaling point of 1800° F.—wide enough to meet practically any heat or cold requirement.

Notice below the other advantages stainless steel and C.M.H. design bring you. Check and compare . . . and we think you'll want the full story of C.M.H. Stainless Steel Bellows!

Ask for Chicago Metal Hose Form SS B 2 on which to submit your bellows requirements. It will save you time . . . assure more accurate transmittal of essential data.

★ Corrosion resistant qualities of stainless steel enable wider application of C.M.H. BELLOWS.

★ Multiple ply construction gives even greater strength factors when needed.

★ Ferrous fittings, attached by Circular Seam Welding, assure permanent, leakproof joints.

★ Uni-metal assemblies avoid the costly troubles encountered where bimetal types or solder joints are used.

★ Long lengths are standard production permitting economical use of C.M.H. Stainless Steel BELLOWS for many unusual types of applications.

★ Better delivery schedules are possible because C.M.H. BELLOWS are standard production products.

Flexible Metal Hose for Every Industrial Use

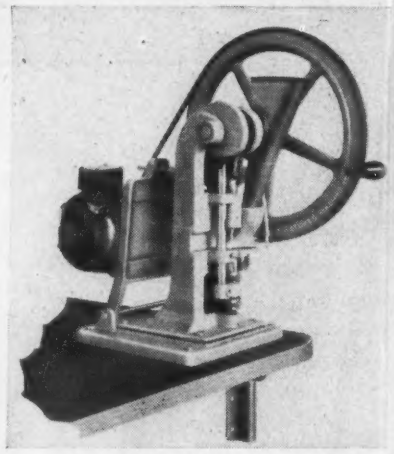
ARMY E NAVY

CHICAGO METAL HOSE CORPORATION
MAYWOOD, ILLINOIS

Plants: Maywood and Elgin, Ill.

work, for making test pellets, proving industrial specialties such as chemical products, catalysts, etc., pharmaceuticals, ceramic mixtures, carbon and powder metallurgy tests and other purposes.

It produces tablets equal in physical properties to those made on larger machines. A core-rod attachment can be



provided to make cored pieces. Bench space is 12 x 18 in.; height, 24 in.; motor, ¼-hp. Available without motor for hand operation; also with variable speed drive to handle various size tablets in runs of considerable length.

Marking Machine

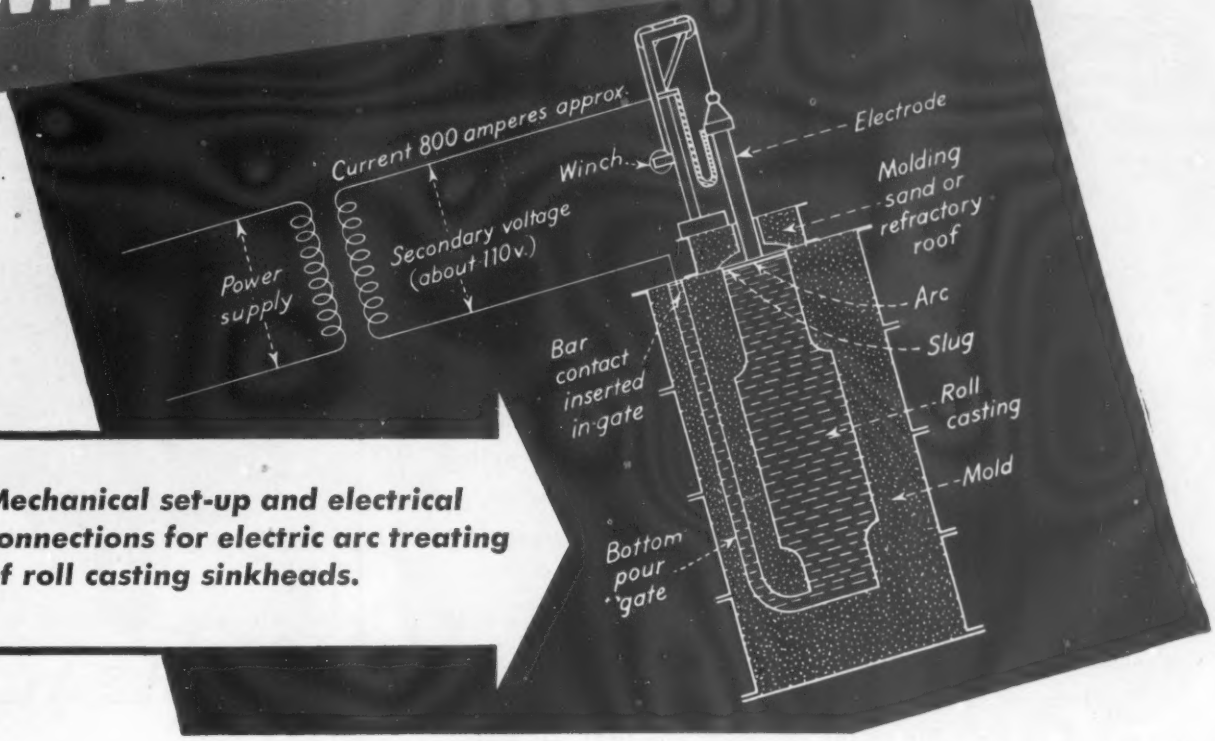
A machine for marking code specifications on formed, welded and extruded shapes either continuously or at desired intervals is offered by Superior Type Co., 1800 West Larchmont avenue, Chicago 13. The equipment is attached to the vertical surface of the machine preceding in line, which furnishes the drive, automatically feeding the strip material into the marking unit. Any part of the upper surface of the strip can be marked as the machine swings into any position in an 180° arc. Stock up to a width of 5 in. can be accommodated. The unit has an enclosed reservoir and ink distributing rollers. It can be provided with a marking roller having interchangeable type and logos, or with smooth cylinder for dies.

Electron Tubes

Featuring sturdy mechanical construction to withstand vibration, shock and rough service in aircraft, automotive and industrial applications of radio and electronic control, new lock-in tubes for high and ultra high frequency applications are offered by Sylvania Electric Products Inc., Emporium, Pa. Tube bases of all metal design provide shockproof positioning of the tube in its socket. Solid socket pins which provide mechanical and electrical contacts with socket parts, are welded directly to tube elements. Utilizing glass "header" construction permitting use of heavier element supports, direct bonding of pins to glass and more

No. 11 of a Series: "Looking at the FIVE ESSENTIAL things you never see in ELECTRODES."

TOP CROP CUT TO 5% WITH ELECTRIC ARC HOT TOPPING



Mechanical set-up and electrical connections for electric arc treating of roll casting sinkheads.

SEVERAL years ago National Carbon Company began a series of experiments with electric arc heating of steel ingot hot tops and the sinkheads of large steel castings. The results of these experiments have been confirmed in commercial practice by several steel plants, which report the process offers economy and an increase in production without upping producing capacity.

One stainless steel plant, where operating practice was exceptionally good, normally obtained a top crop of 8½%. Electric arc hot topping reduced the crop to 5% . . . at a saving of several dollars per ton over the cost of the hot topping operations.

At another plant producing large roll castings, 694 tons of metal were treated. Castings averaged 27.8 tons. Total saving was 111.4 tons, an average of 4.5 tons per casting. The cost: less than $1 per ton of metal treated.

Hot topping apparatus is inexpensive. Electrode consumption is only one-half pound per ton of metal treated.

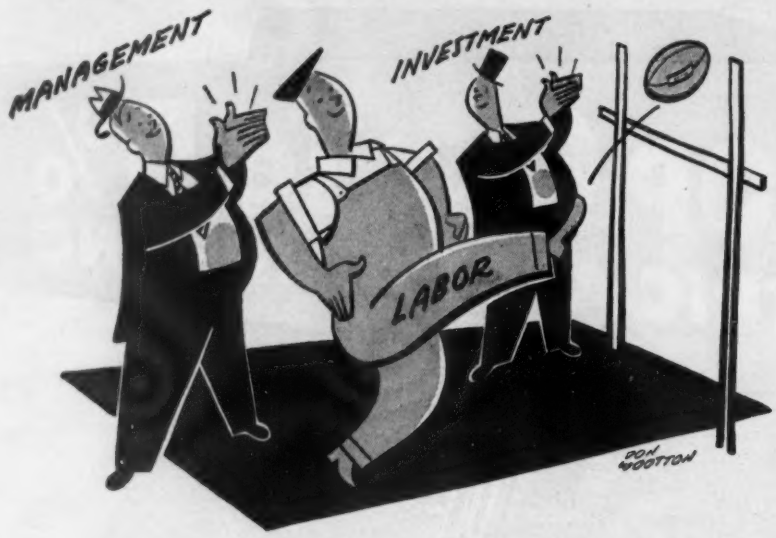
Our experimental work with hot topping is part of what we call "customer service"—one of the five essential things you never see in "National" carbon and "Acheson" graphite electrodes. The others: selection of raw materials, manufacturing experience, manufacturing control, and continuing research. We invite you to write our nearest office about these reasons for the superior performance of "National" and "Acheson" electrodes.

NATIONAL CARBON

ACHESON GRAPHITE

The words "National" and "Acheson" and the "National" and "Acheson" Seals are registered trade-marks of National Carbon Company, Inc.

NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation
UCC
GENERAL OFFICES: 30 East 42nd Street, New York 17, N.Y.
DIVISION SALES OFFICES: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco
In Canada: Canadian National Carbon Company Limited, Toronto 4, Canada



TEAMWORK PAYS

One of the peculiar things about money is that it can never be paid—to anybody—until it is *earned.*

Management earns money by doing a good managing job—by operating plants that make things people are willing to buy for a little more than those things cost to produce.

Invested capital earns money by furnishing the finances for industry's operations.

Labor earns money by doing productive work—by selling skill and time and energy to industry.

All three can increase earnings only by producing more—to give better value to the customer who pays out money for the products of industry.

The interests of labor, management and finance are best served when all three work as a team, for a common goal.

That kind of teamwork will do more for America than all the laws that can be enacted, or all regulations that government can devise.

Geo. D. Trundle Jr.
President

THE TRUNDLE ENGINEERING COMPANY

Brings to Industry and Business

26 Years **OF CONSULTING MANAGEMENT ENGINEERING EXPERIENCE**

GENERAL OFFICES • CLEVELAND • BULKLEY BUILDING

CHICAGO
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durable glass envelope construction, tube design also reduces lead inductance and interelement capacity.

Tube is particularly adaptable for higher frequencies allocated for tele-

vision, aircraft radio and railway train communication.

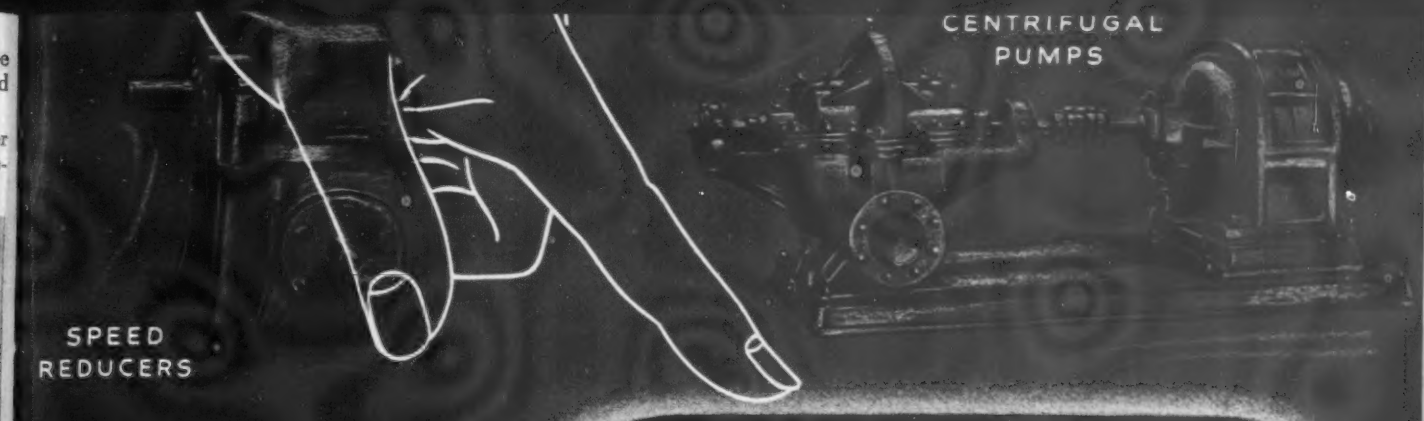
Welding Electrode

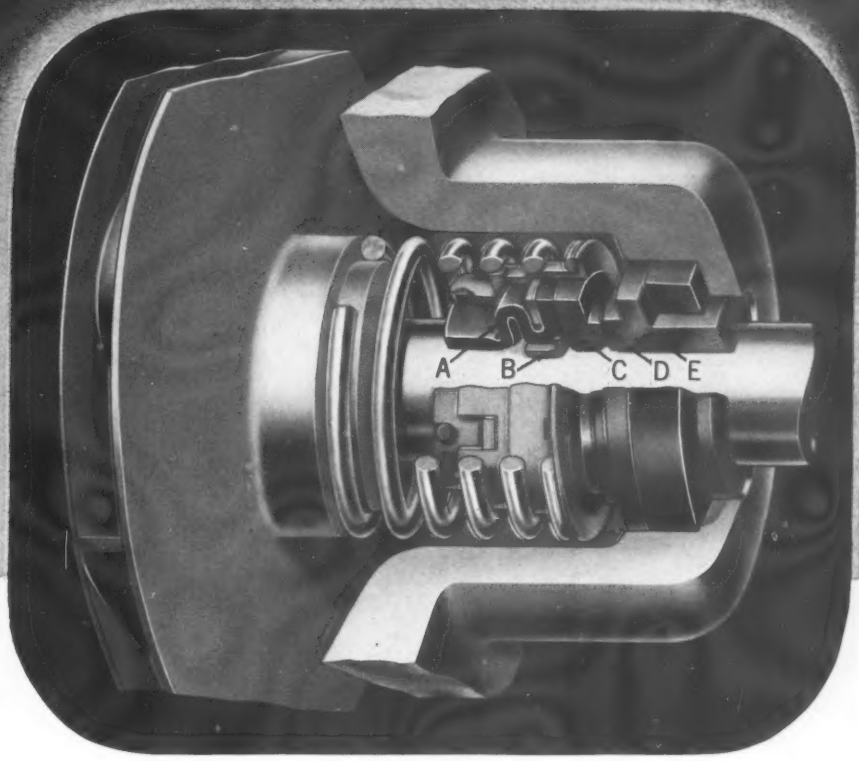
Alloy Rods Co., York, Pa., announces the addition of Nickel-Arc, a machinable cast iron welding rod, to its line of stainless and tool steel electrodes. It may be used freely on either ac or dc current in all positions. No preheat is required to obtain porosity-free deposits completely machinable in the weld deposit fusion zone. The weld deposit is free from cracks or cross checking in multiple pass welds and after machining or grinding the weld deposit closely matches the color of the parent cast iron and withstands hydrostatic pressure.

Rotary Sleeve Seal

A development recently introduced is the elastic sleeve seal for centrifugal, rotary, reciprocating, and other pumps using rotating shafts that must be sealed.

The seal is at present being manufactured for use with new compressors and as a replacement seal for old. It has been proven that they work equally well on bent, pitted, or slotter shafts and eliminate all springs, shims, and





Investigate THIS *New* SHAFT SEAL!

The JOHN CRANE Bellows Shaft Seal is giving excellent and trouble-free service on all types of shaft sealing applications, such as found on the following:

Turbine Pumps • Speed Reducers • Refrigeration Compressors • Rotary Pumps • Agitator Shafts • Centrifugal Pumps

This precision-built Shaft Seal automatically adjusts for washer wear and shaft end play. Eliminates stuffing box leakage, gland adjustment and shaft wear. Excellent for high speeds and high pressures.

The JOHN CRANE Bellows Shaft Seal can be furnished in various metals and synthetic rubber stocks in order to best suit different operating conditions. Made in two basic types: Type I (for limited diameter) and Type II (illustrated above) for limited length.

A Synthetic Rubber Bellows—tail seals on shaft. Head is flexible; adjusts automatically for washer wear or shaft end play.

B Protecting Ferrule—prevents flexible bellows from adhering to shaft; assures free movement.

C Sealing Washer—rotates with shaft; driven through metal parts; no torque on bellows.

D Sealing Faces—both carefully lapped at our factory to insure a perfect seal.

E Floating Seat—cushioned in synthetic rubber sealing ring, eliminating stress distortion of sealing faces.

Manufacturers and Design Engineers
Write for Bulletin!

Crane Packing Company • 1879 CUYLER AVENUE CHICAGO 13, ILLINOIS

Baltimore • Boston • Buffalo • Cleveland • Dallas • Detroit • Houston • Los Angeles • New Orleans • New York • Philadelphia • Pittsburgh • San Francisco • St. Louis • Tulsa

DIAMOND G MULTI-CLAMP

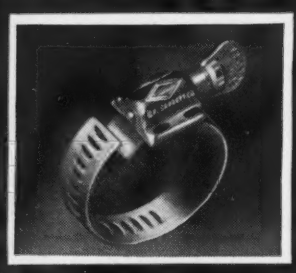
The Clamp of a thousand uses...

Here's a new clamp that meets the needs of many industries . . . a clamp that solves scores of problems quickly and economically!

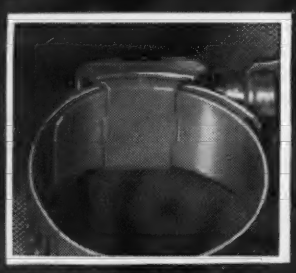
The new Diamond G MULTI-CLAMP instantly FITS and HOLDS rubber hosing, metal pipe, tubing, cables and other equipment in a vise-like grip. No wrench, no screw-driver, no disassembling necessary. The patented worm-type self-locking screw assures uniform instant adjustment. Each standard MULTI-CLAMP covers a wide range of sizes and adjustments. Continuous "gear-action" solid band prevents leakage or unequal pressure at any point!

The Diamond G MULTI-CLAMP is corrosive-resistant and meets current Army-Navy specifications. It can be used repeatedly and is practically indestructible. Mechanically held and securely welded . . . a double safety feature! For special purposes, various types of inserts, extra wide bands of metal, plastic or rubber are available.

See the MULTI-CLAMP in action . . . for automotive, aviation, railroad, marine, electrical, hydraulic, pneumatic, electronic, household use and general plant applications. Sample on request.



Easy to Install—no disassembling



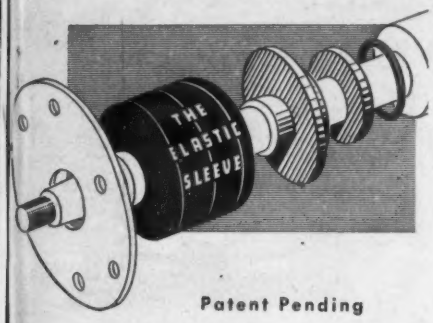
Double Safety Feature—mechanically held *and* welded

GEORGE K. GARRETT CO., INC.
1421 CHESTNUT STREET, PHILADELPHIA 2, PA.

DIAMOND G PRODUCTS

shaft glands due to the perfected development of a new oil resistant elastic material which is being used as the body of the elastic sleeve.

To assure longer life with proper lubrication, the seal bearing of the device is located at the source of the oil supply. The design, which has been



Patent Pending

worked out for all modern installations, enables faster placement due to fewer assembly parts with no fragile parts to break during assembly. This rotary seal is a product of Temperature Control Devices, New Haven 15, Conn.

Flat Broach Sharpener

Great Lakes Broach & Gage Co., 1008 Franklin street, Detroit 8, is offering a new flat broach sharpener and back-off machine designed to meet the requirements of fast servicing of flat broaches. This machine will handle practically all flat broaches, insets, keyways, and

broach bar assemblies. A particular feature is the handle for the table feed, graduated to 0.0005, thus enabling the operator to re-step and back-off keyways and other similar broaches without employing a surface grinder.

Torque Tester

Checking torque wrenches, measuring torque necessary to screw and unscrew threaded parts, determining starting torque of motors, and other measurements are performed by an instrument which gives the results directly on dial.

These torque testers are made in a range of capacities from 50 in.-oz,

New Baker ARTICULATED Fork Truck cuts aisle requirements

DESIGNED PRIMARILY FOR EFFICIENT WAREHOUSE OPERATION

A basically new design* involving a new method of steering by "articulating" the frame, permits swinging the load to line it up in position without lining up the truck itself. Thus this truck requires about two feet less space for placing loads at right angles to aisles. It needs less clearance on turns, and speeds carloading or any other handling operation where loads must be lined up or positioned in congested areas.

Specific advantages of this truck are:

1. Works in narrower aisles.
2. Turns in a smaller radius.
3. Spots loads quicker and easier.
4. Control units are more accessible.
5. Simpler Steering design cuts maintenance.
6. Permits mechanization of handling where hand trucks were necessary because of space limitations.

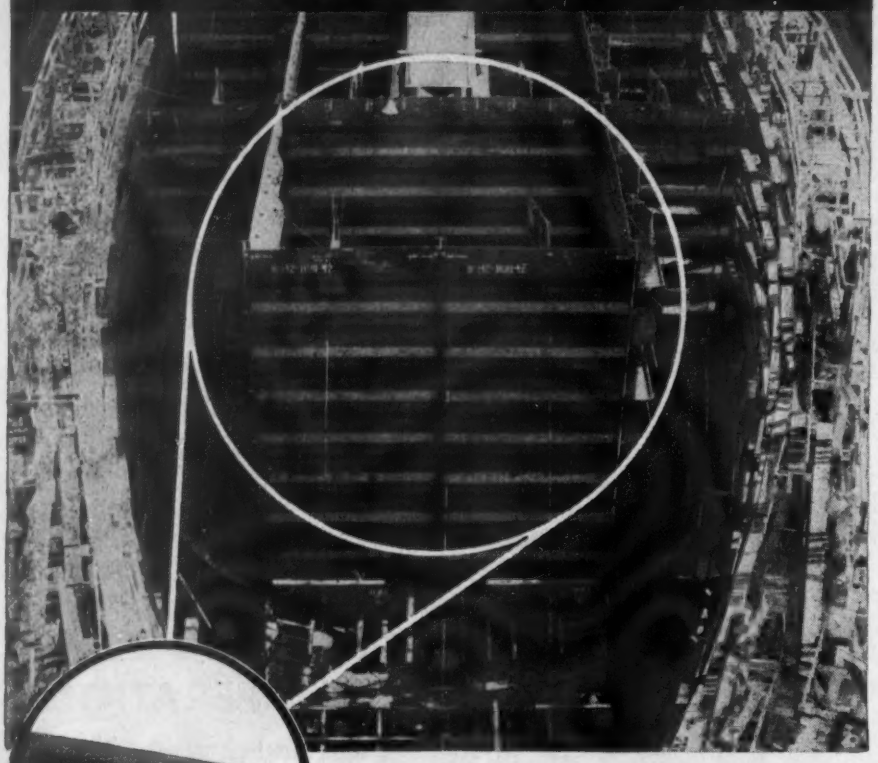
Field tests in both warehouse and production operation have proved the many advantages of this new truck. For complete specifications request Bulletin 1330.

*Licensed under Stevenson Patent No. 2,284,237.

BAKER INDUSTRIAL TRUCK DIVISION *of The Baker-Raulang Company*
2167 West 25th Street • Cleveland, Ohio
In Canada: Railway and Power Engineering Corporation, Ltd.

Fort Pitt Bridge

PRESSED PLATE SECTIONS



SPEED AMERICA'S

Tankers off to War!

This illustration shows one application, by an important western ship builder—of the two ton bulkhead plates prefabricated on Fort Pitt Bridge's 36-foot Hydraulic Press—IN ONE OPERATION. Just as this war-developed facility aids the Maritime Industry, it too, is highly important for peacetime needs—varied heavy shapes can be pressed in a single operation, providing lower costs, constant product uniformity, eliminating many useless operations.

Descriptive Bulletin on request.

"Steel Permits Streamlining Construction With Safety, Endurance and Economy"

FORT PITT BRIDGE WORKS

General Offices: Pittsburgh, Pa. Plant at: Canonsburg, Pa.

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NEW YORK, N. Y. . . . 441 Lexington Avenue
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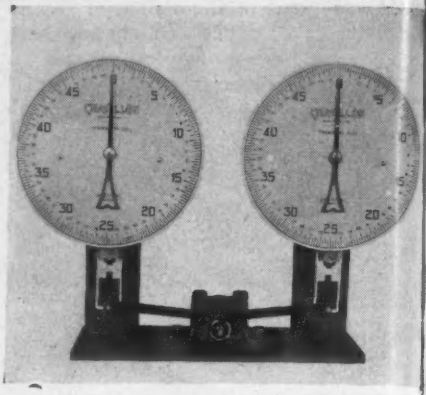
DETROIT, MICHIGAN . . . New Center Building
PHILADELPHIA, PA. . . . Commercial Trust Bldg.

up to 1000 ft-lb, graduated in 5 ft-lb. In using the instrument it is necessary to supply torque to the shaft and resulting force is indicated on the dial. The shaft can be provided with pin, vise, adapters,



or other fittings to suit the application.

This instrument is made by John Chatillon & Sons, 85 Cliff street, New York 7.

Welder's Truck

Designed to accommodate one gas and one air cylinder, a new welder's truck is offered by Palmer-Shile Co., 796 South Harrington avenue, Detroit 17. Truck handles are equipped with cross bar on which Gasaver or torch hanger may be mounted. Hooks welded on handles provide a place for hanging gas hose

when not in use. Tool box is mounted on swivels so that tools are always in level position.

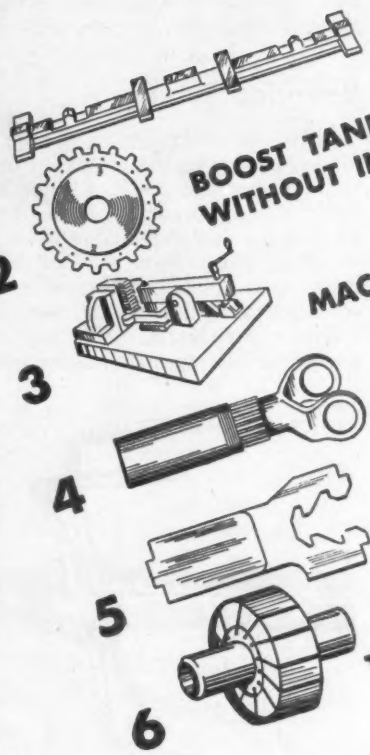
Unit is of all metal, all welded construction. Frame work is of angle iron and sheet metal. Handles are of heavy tubular steel. Overall height is 48 in., width 29 in.; wheels are 24 x 2 in.

Soldering Irons

Electric soldering irons for battery use are offered by Hexacon Electric Co., 139 West Clay avenue, Roselle Park, N. J., in 100 or 200 w sizes wound for either 12 or 24 v. All irons are available with either 6 or 12 ft cords and with plug cap or battery clips.

Heating element is housed in damage-

The Kind of Job Colonial Broaches helped to do.....



1. CUT COSTS OF AUTOMATIC RIFLES 57%
2. BOOST TANK SPROCKET PRODUCTION 300% WITHOUT INCREASE IN MAN POWER OR MACHINES
3. MACHINE 7 DIFFERENT PARTS IN 60 SIZES ON ONE MACHINE
4. PRODUCE SPLINE FITS WITH "ZERO" BACKLASH
5. MAKE ONE BROACHING MACHINE DO THE WORK OF 3, 6 OR MORE MILLING MACHINES
6. TURN OUT PARTS IN PRODUCTION TO TOOL ROOM PRECISION

Those are just a few typical examples. Colonial field engineers can help you cut costs, boost output, or increase precision. A call, a letter or a wire to Colonial will pay dividends.

Are you on the mailing list to receive "Broaching News"?

colonial BROACH COMPANY
DETROIT 13, U.S.A.

Broaches Broaching Machines - Broaching Equipment

The properties that make Kennametal outstanding for fast, economical machining of steel, cast iron, non-ferrous metals, and non-metallics, are equally useful when applied to a variety of other production processes. Shown on this page are a few examples that suggest scores of economic applications of Kennametal on special tools, dies, and rolls.

Kennametal is the tough, strong, cemented carbide that contains an extremely hard intermetallic compound, $WTiC_2$. Its superior wear-resistance comes from a combination of precisely maintained properties— high modulus of elasticity (2 to 3 times that of steel); low coefficient of friction; and exceptional hardness (up to 92.3 on Rockwell A scale).

Kennametal can be accurately molded into almost any shape, limited only by reasonable proportions. Its cost is moderate—almost insignificant when compared with the tool and production economies effected through its use. The best way to prove this is to let us cooperate with you in designing a Kennametal tool for test purposes on your specific job.

Remember, Kennametal can be used in your production machines without entering into any complicated, continuing agreements.

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
KENNAMETAL Inc., LATROBE, PA.

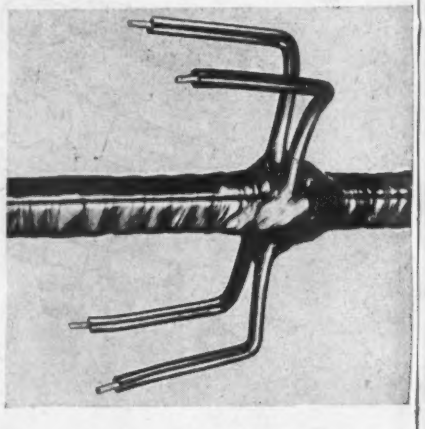
proof hexagon shaped barrel which protects it from all danger of mechanical injury. Due to hexagon shape, irons can be held in vise when replacing tip without danger of denting housing or elements. High heat alloy core resists scale and prolongs the life of element.

Circuit Tester

An all-purpose electric tester is available from Amerline, 1753 North Honore street, Chicago 22. The tester is of the vest pocket type and indicates voltages from 90 dc, and 60 ac, to 500 v ac or dc. A General Electric neon lamp on the top glows in varying intensities indicating circuit conditions. No glow indicates a dead line. The lamp lights on currents as low as 1 microampere. The new tester can be used for locating blown fuses, trouble-shooting electric appliances, testing radio circuits, etc.

Extruded Tubing

Known as Miccrotube, a new product for insulation of plating racks is offered by Michigan Chrome & Chemical Co., 6340 East Jefferson avenue, Detroit 7. It is an extruded tubing made from an elastic plastic base material that has resistance to plating baths and cleaning solutions. It will withstand hot plating solutions, including 180-190° copper and practically all types of boiling cleaning



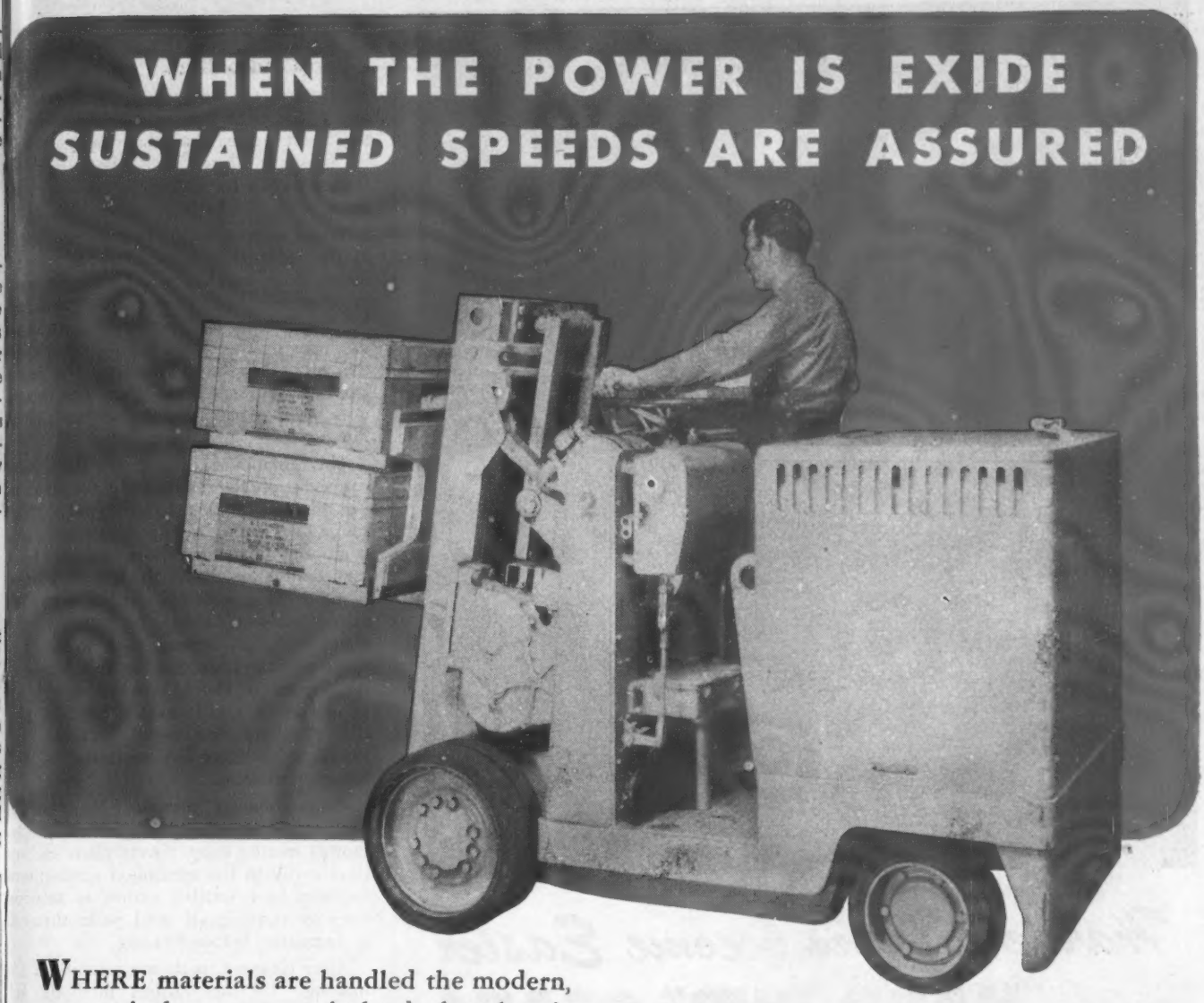
solutions indefinitely without damage or deterioration. It is not recommended for use in trichlorethylene. Its surface is smooth and glassy which permits solutions to drain from racks more quickly. It is available with inside diameters ranging from $\frac{1}{8}$ to 1 in.

Electrode Holder

Exposed metal surfaces of the new screw type electrode holder offered by Allis-Chalmers Mfg. Co., Milwaukee, are constructed of spatter-resistant Mallory metal. Simplified design facilitates easy replacement of parts and heavy insulation and handle ventilation provide cool operation.

It is available in light and heavy duty sizes to accommodate electrodes up to $\frac{3}{8}$-in. diameter.

WHEN THE POWER IS EXIDE *SUSTAINED* SPEEDS ARE ASSURED



WHERE materials are handled the modern, economical way—as unit loads by electric industrial trucks—tonnage figures climb and handling costs go down. And when the motive power is Exide, sustained speeds, all day long, are assured.

Thousands of Exide Batteries are in service on the factory and warehouse fronts . . . helping to keep war supplies moving smoothly . . . and getting them off to a running start. Exides are specially designed for this important service. They have the extra power and rugged construction the job demands. For dependability, long-life and ease of maintenance, you can always count on Exide Batteries.

Write us for a FREE copy of the bulletin "Unit Loads," prepared by The Electric Industrial Truck Association. It tells how to cut handling costs up to 50% . . . covers latest developments in materials handling . . . and includes actual case histories.

POWER

ARMY E NAVY

Exide
BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32

Exide Batteries of Canada, Limited, Toronto

Harder Tasks become Easier with **"HARD-DUR" GEARS**

★ **"HARD-DUR" Gears preserve the tooth form. They are made only of the finest gear steels and are scientifically heat treated to obtain the maximum physical properties. They are so much stronger, harder and more wear-resistant than similar untreated gears that they are guaranteed to have four to five times the life and at only 50 per cent extra in cost.**

"HARD-DUR" Gears handle the tough jobs on which ordinary gears fail and when used on the average job they last almost indefinitely.

Send note on Company Letterhead for 488-Page Catalog 41

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVENUE • CLEVELAND, OHIO, U. S. A.

Multiple Brazing

(*Continued from Page* 111)

steel parts at the brazing temperature and at the same time effectively remove any light oxide films that may already be present. Thus there is no need to flux work to be brazed in such a furnace.

When copper is applied to the joint in the form of granulated or powdered metal, it is usually mixed with lacquer or other vehicle to form a paste that can be applied to the joint area. In this case use of the right vehicle allows all the copper to be drawn into the joint by capillary action so that practically no copper remains on the surfaces near the joints.

The assemblies coming off the chain conveyor of the continuous furnace in Fig. 8 are of this latter type. Here frames for radio tuning condensers are made by assembling ¼-in. square bars into cutouts in ⅛-in. thick end plates. A paste of granulated copper particles mixed with a vehicle is painted for about ¼-in. all around each joint. Yet upon coming from the brazing furnace, no copper is visible around the joint except for a small smooth fillet in the corner where the metal sections are joined, none whatever remaining on the adjacent surfaces.

Preparation Is Simple: No flux is used on the insecticide dispenser. Even though molten copper wets plain carbon steel easily in the controlled atmosphere furnace, best wetting action is assured here by running all steel parts through a degreaser before brazing.

After cleaning, parts are assembled for brazing. Of the various methods for applying copper to the joint—use of copper wire clips, foil bands, filings, molten spray, powder paste, electroplated coatings—the container assembly employs a combination of electroplated parts, copper wire rings and a small slug made from a short length of wire.

Since parts going through the brazing furnace are heated to 2050° F, the assemblies must be put together in such a manner that they maintain their proper relationship. Unless securely positioned, parts can slip from expansion and softening of the metal, causing a faulty assembly.

Best method of assuring maintenance of proper relationship between all parts is to use some form of mechanical locking to hold the mating parts together. Parts can be swaged, spun, staked, expanded, wedged, interlocked, screwed, riveted, pinned, spot or tack welded or otherwise secured in position mechanically.

In the insecticide container, staking and pressing are employed. Fig. 3 is first step in the assembly line. Here an operator is shown staking the valve body, puncturable cap and tube assembly. The valve body (M, Fig. 2) is a steel screw machine part. The puncturable cap (G, Fig. 2) is formed from 0.005-in. steel sheet, copper plated

B&W DIRECT-FIRING PULVERIZED-COAL CIRCULATING SYSTEM

SERVICE-CHECKED on all these points

SIMPLE INSTALLATION
Only one pulverizer with a single circulating line for pulverized coal required by the system.

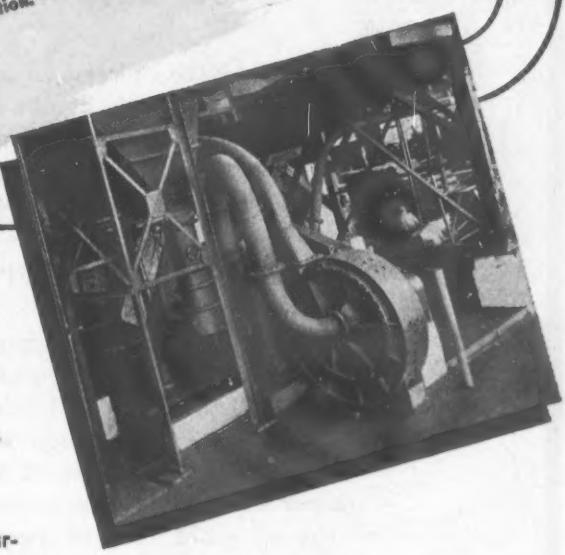
SAVES FLOOR SPACE
Space at furnaces clear for product handling — pulverizer at a distance — circulating loop overhead.

FLEXIBLE MULTI-FURNACE OPERATION
As many take-offs to burners as needed. Burners may be turned on and off as desired.

INCREASED FURNACE OUTPUT
Existing installations show shorter heating cycles with lower fuel consumption per ton of castings.

SUSTAINED FURNACE CAPACITY
Pulverizer maintains its rated capacity in coal to the fineness required by the installation.

UNIFORM FURNACE TEMPERATURE
Temperatures easily controlled, by methods similar to those used with gas and oil firing.



FOR SIMPLIFIED FIRING OF METALLURGICAL FURNACES, investigate the B&W Direct-Firing Pulverized-Coal Circulating System. Its economy and efficiency have been proved on billet heating, reheating, forge, malleable-iron annealing, zinc fuming and other types of metallurgical furnaces.

This method of firing is equally applicable to other metallurgical furnaces, including ingot, bloom and billet heating furnaces; normalizing furnaces; copper, lead, and zinc melting furnaces; multiples of small units such as small forge furnaces and process heating furnaces in chemical industries.

The same B&W pulverizers, used in this system are also providing economical *direct-firing* of individual furnaces. For further details, write for Bulletin 3-333.

B&W

BABCOCK & WILCOX

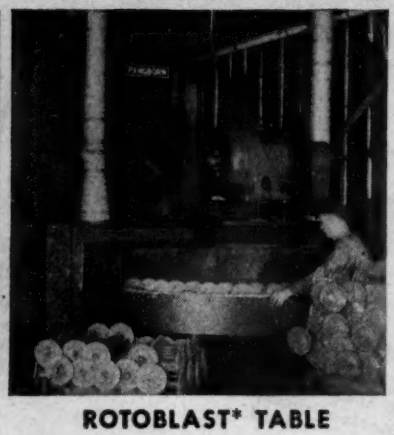
THE BABCOCK & WILCOX CO.
85 LIBERTY STREET, NEW YORK 6, N.Y.

Water-Tube Boilers, for Stationary Power Plants, for Marine Service . . . Water-Cooled Furnaces . . . Superheaters . . . Economizers . . . Air Heaters . . . Pulverized-Coal Equipment . . . Chain-Grate Stokers . . . Oil, Gas and Multifuel Burners . . . Seamless and Welded Tubes and Pipe . . . Refractories . . . Process Equipment.

PM-108

CLEANS FAST!

ROTOBLAST* BARREL



ROTOBLAST* TABLE

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BLAST CLEANING played an important part in the successful production of bombs and shells and tanks and ships for this war. The main objective of the metal industry has been to *speed* production of *better* products. Pangborn engineers provided both Air and Airless equipment to do this job. Industry uses these modern machines to increase speed as much as 300 percent over previous records.

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PANGBORN CORPORATION · HAGERSTOWN, MD.

The cap and the copper plated steel t
(F, Fig. 2) are fitted into the bottom
the valve body. Dies in the staking p
then upset metal of the valve body
three points around the cap and t
securely locking the assembly.

When the loaded dispenser is to
used, the needle valve controlling
lease of the contents first puncture
tiny hole in this cap. But previou
the contents have not had an oppor
nity to escape because of the positi
seal provided by the brazed-on cap. T
insecticides (DDT or pyrethrum, a
other components) are dissolved in liqu
Freon which turns to gas at room te
peratures and pressures. It is the pr
sure from the Freon that discharges
contents.

At the same time, high temperatu
from a nearby fire, etc., might cause
pressure in the dispenser to build
to a value where it would explode.
provision for a safety blowout is
corporated at C, Fig. 1, where a sm
pierced hole is sealed with a low-melti
point alloy for just this purpose.

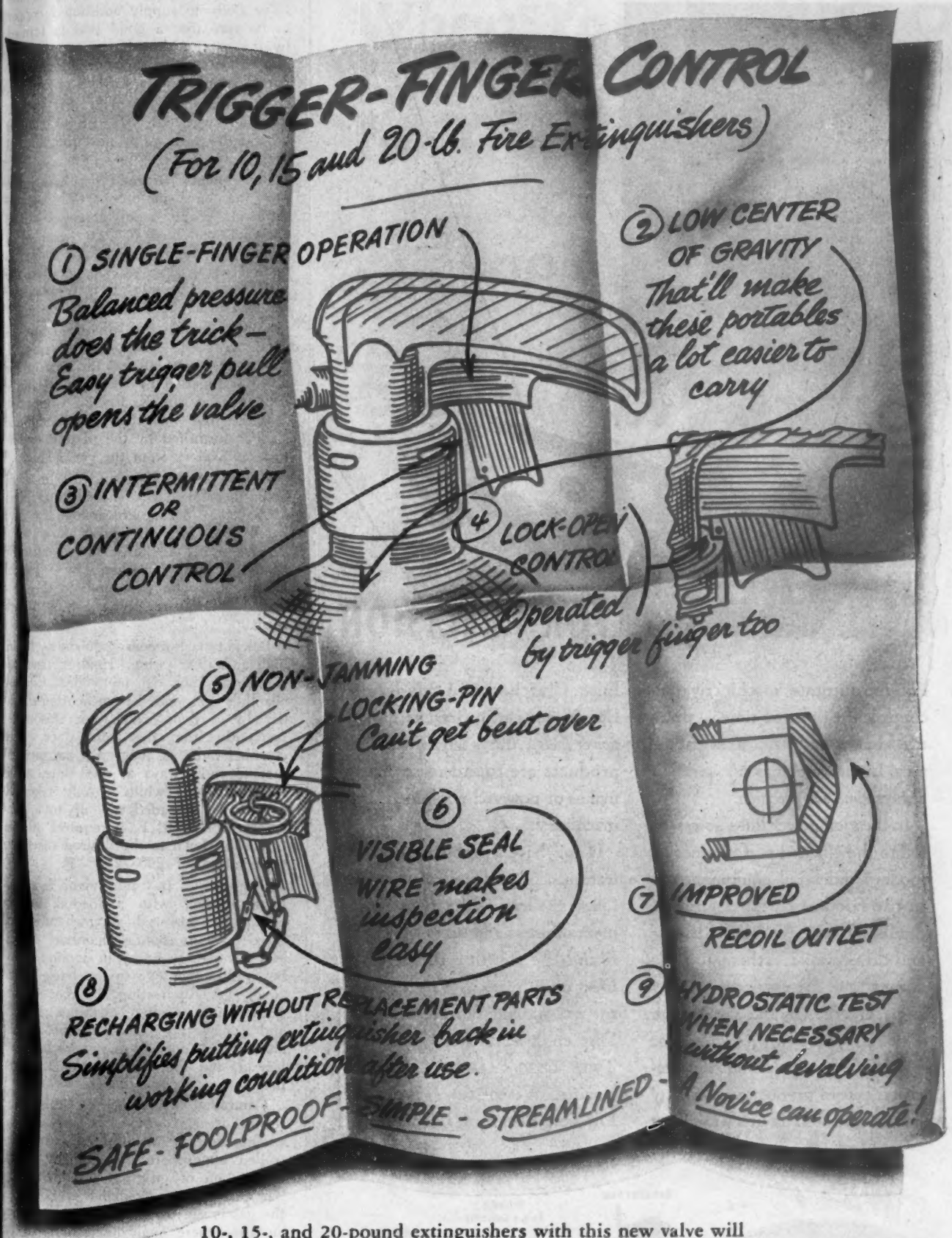
Fitting Subassemblies: Fig. 4 sho
start of a double line feeding the fi
joining station at Fig. 5. The dispen
is charged through a small scre
machine part fitted into the bottom h
of the container as shown at A, Fig.
This fitting is also seen at D, Fig. 2

At the near station in Fig. 4, this
fitting has the copper ring (E, Fig.
slipped over it and then is pressed a
staked into the lower half of the co
tainer (B, Fig. 2).

At the far station, another opera
is placing the valve and tube assem
in the upper half of the container, wh
it also is securely locked by pressi
and staking dies. This operator a
slips the copper ring C, Fig. 2, just
side the mouth of the open end of
shell half where it will be engaged
a shoulder on the mating half as
final assembly is made. Each of
two operators in Fig. 4 places the s
assemblies she has made on one o
set of two double decked troughs do
which the sections roll to the opera
in Fig. 5.

Final Assembly: The two halves
the shell now have all fittings attac
and are ready to be fitted together
form the container. This is done at
station shown in Fig. 5 where the
halves are pressed together under so
3000 lb pressure, assuring a tight me
to-metal fit throughout the entire b
joint. A shoulder provided on the tum
in portion of the lower shell (see B
B, Figs. 1 and 2) engages the ring m
of 0.050-in. copper wire as the
shell halves come together to assure
the brazing copper is properly pla
so it will melt and run *into* the j
in the furnace. A wire rack like
seen in extreme foreground, Fig.
holds the containers upright while g
through the furnace.

Just before being placed in the
nace, a small slug (K, Fig. 2) made f
a $\frac{3}{32}$-in. length of 0.032-in. diameter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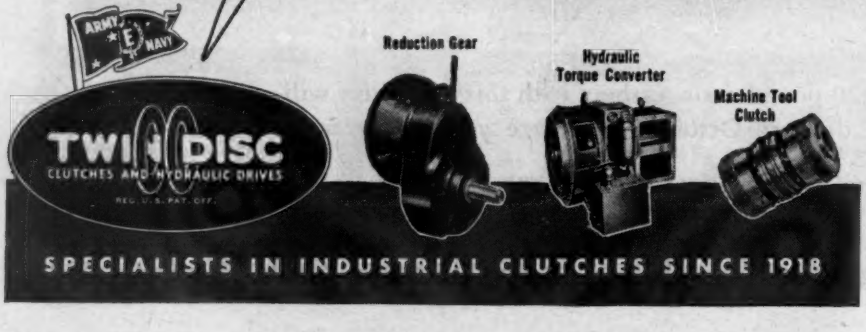

per wire is dropped in the top of the valve body to supply additional copper to be sure that a good seal is formed by the cap. Although the cap itself is copper plated, this slight additional copper is supplied as a further precaution.

Also a copper ring made of 0.032-in. diameter wire (H, Fig. 2) is clipped around the valve body next to the steel shell.

Five Joints Brazed Simultaneously: Now we have the copper ring E (of 0.032-in. diameter copper wire) and fitting D mounted in lower end of B (all Fig. 2), to make the joint shown in section at A, Fig. 1. Copper for the main joint at B, Fig. 1, is supplied by the large ring C, Fig. 2.

Copper to join the valve body to the container shell is supplied by ring H, Fig. 2. Material to seal the cap in the valve is supplied by the plating on the cap and the slug K, Fig 2. Copper to seal the tube into the valve body and shell is furnished by the plating on the tube as well as from the small slug.

A tray 28 in. long and 18 in. wide holds 50 containers. The Chicago plant of Salkover Metal Processing has two batch type furnaces and a large continuous unit. All three are electrically heated, were furnished by General Electric Co. who also supplied the controlled atmosphere equipment used with them.

Batch type furnaces have doors 10 in. high and 18 in. wide. Heating chamber is 42 in. long, 18 in. wide. Cooling chamber is separated from heating chamber by a door which operates independently from the front door. This chamber is 96 in. long so it can accommodate three trays at one time. This is essential for while it only takes 10 min to get a loaded tray up to a temperature of 2050° F, it requires 30 min to cool it down to the desired discharge temperature of 200—250° F.

Sequence of tray movement is as follows, starting with a loaded furnace holding one tray in heating chamber and three trays in cooling chamber: Operator removes rear tray in cooling chamber, pulls other two to the back of this zone. Tray in heating chamber is then pushed into cooling chamber Fig. 6, and a new tray placed in the heating chamber. As soon as new work has been heated, the cycle of movement is repeated.

Controlled Atmosphere: Each batch furnace is rated 50 kw; both heating and cooling zones being supplied with a controlled atmosphere obtained by partial combustion of city gas rated 800 Btu per cu ft. After cracking at 2000° F, the gas is run over a catalyst, producing an atmosphere analyzing about 76 per cent nitrogen, 14 per cent hydrogen, with some carbon monoxide, carbon dioxide and methane present, but no oxygen or water vapor.

Each of these furnaces easily handles an output of 200 lb of work per hour and is served by an individual atmosphere unit that supplies 200 cu ft per h

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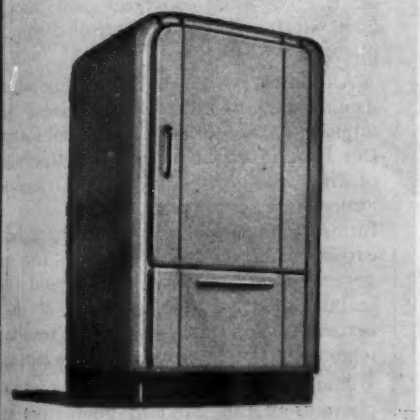

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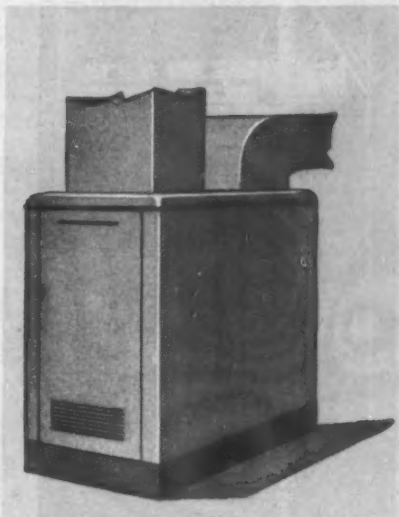

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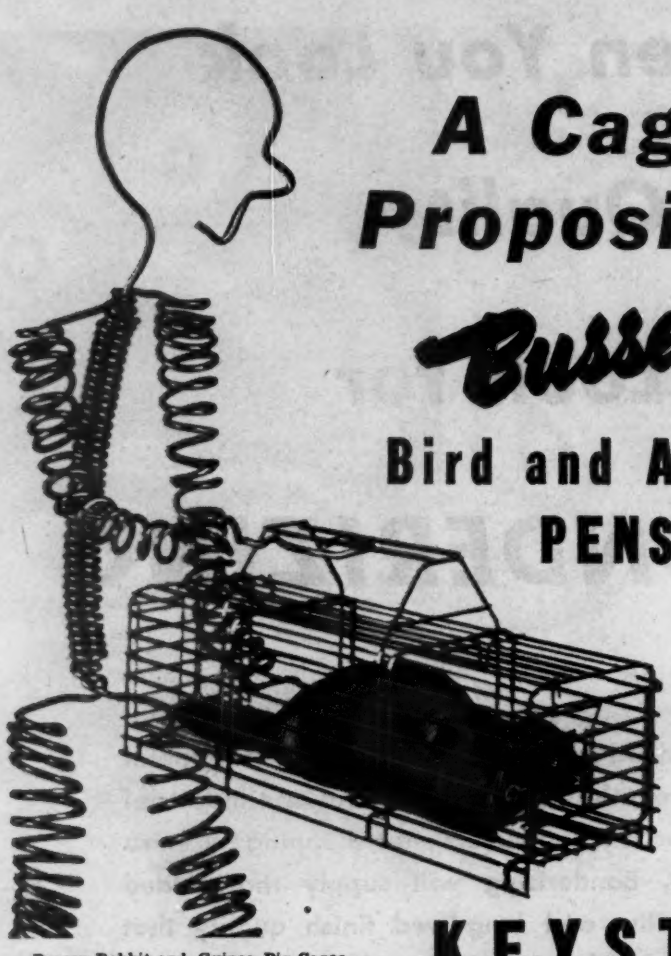

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of gas mixture for protecting the work.

Continuous Furnace: Figs. 7 and 8 show entrance and exit ends of the continuous unit. Rated 100 kw, this furnace has a chain mesh conveyor belt 20 in. wide. Door opening is 12 in. high, 20 in. wide. Heating chamber is 10 ft long, cooling zone 28 ft long.

Chain speeds are adjustable from 12 to 60 ft per hour to handle various types of work. Heavy sections like those shown being loaded in Fig. 7 require more heating and cooling time because of the larger mass of metal involved. Light assemblies such as the radio tuning condenser frames shown coming off the conveyor in Fig. 8 require little time as they come up to heat rapidly.

The continuous furnace easily handles 400 lb of work per hour. Due to the fact that entrance and exit openings allow escape of considerable amounts of controlled atmosphere, this furnace requires a much larger gas converter than the smaller batch units. Seen at the left in Fig. 8, this converter can supply 2000 cu ft per hr of controlled atmosphere.

All three of the standard atmosphere generators and all three furnaces are interconnected so that any combination can be utilized increasing the flexibility of the plant. In addition a Drycolene atmosphere generator is available to furnish a special atmosphere where high carbon parts are to be brazed. The gas generator is necessary to avoid decarburization of the surface of high carbon steel parts — and the resultant tendency toward softening of the surface.

Main difference between the atmosphere from the standard generators and the Drycolene unit is that the latter has no carbon dioxide. It analyzes approximately 76 per cent nitrogen, 14 per cent hydrogen, with some carbon monoxide and methane, but no oxygen or water vapor. After cracking the city gas at 2000° F, it is passed over hot charcoal which effectively removes any trace of carbon dioxide that might cause decarburization.

Bright Satin Finish: One of the main features of copper brazing in a controlled atmosphere furnace is that the work comes from the furnace with a beautiful bright satin finish. All oxide coating along with all dust, finger marks, and the like are completely removed. (Of course heavy oxide coatings must be removed prior to brazing, by pickling or a similar method.) The result is a finish that is exceptionally pleasing and clean in appearance.

At the same time careful placement of the copper brazing material will result in all of it being drawn into the joint by capillary attraction, leaving no copper to mar surfaces near the joint.

This desired capillary action depends upon the copper wetting the metal assured by use of proper flux in ordinary brazing work where a gas flame or carbon resistor blocks are employed to heat the work. Requirements of such a flux appear to be the ability to absorb

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or dissolve off the oxide of the meta being joined, the ability to float thes oxides up through the brazing metal combined with a slight etching actio on the base metal.

In electric furnace brazing these re quirements are met by use of the prope controlled atmosphere. A slightly re ducing atmosphere removes light oxide easily, at the same time providing a etching action. Result is that the copper brazing material flows readily and is drawn throughout all portions of the joint by capillary action. In fact, Mr Jacobsmeyer states the molten copper will travel through joints a distance up to 6 in. Thus long joints or mating sur faces that are not readily accessible can be brazed with assurance of a good joint

Often inaccessible mating surfaces have the copper supplied where wanted by cutting a grove in one of the surfaces so that the copper wire can be embed ded in the groove which is made just deep enough to receive the wire. This method of applying the brazing material to the joint assures molten metal where wanted and prevents any possibility of discoloring the work from excess copper flowing on surfaces near the joint.

Copper Or Brass: Some engineers prefer to use brass wire as the brazing material in the controlled atmosphere furnace because it melts at a somewhat lower temperature and thus results in less power consumption in heating and longer furnace life.

However, brass usually involves some difficulties from the fact that a flux coating is usually required to help it wet and flow over the surfaces to be joined. Also there is a tendency for the melting point to vary due to distillation and subsequent loss of the zinc from the brass as it comes up to temperature.

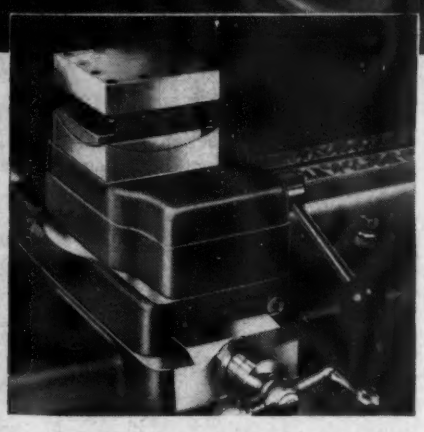
Braze Any Metal: Parts made of almost any ferrous or nonferrous metal can be brazed in the controlled atmosphere furnace provided caution is taken to see that the brazing metal is one which will melt and flow at a temperature appreciably lower than that of the metal parts being joined; will wet the base metal; and is properly placed so it can creep throughout all portions of the joint.

Pure copper wets low carbon steel easily, so that is the combination employed in the insecticide container described here — and in most furnace brazing. Steels containing chromium, silicon, vanadium, aluminum and manganese tend to form oxides which can only be reduced by use of the proper flux, impurities in the furnace atmosphere aiding formation of these oxides and preventing their reduction by the controlled atmosphere.

Nickel, on the other hand, has a great affinity for copper and thus tends to facilitate the required wetting action. So it is a good element to include in the steel wherever possible.

Safety "Plug": Coming from the brazing furnace at 2000-2050° F,

Versatility---for Every Precision Job



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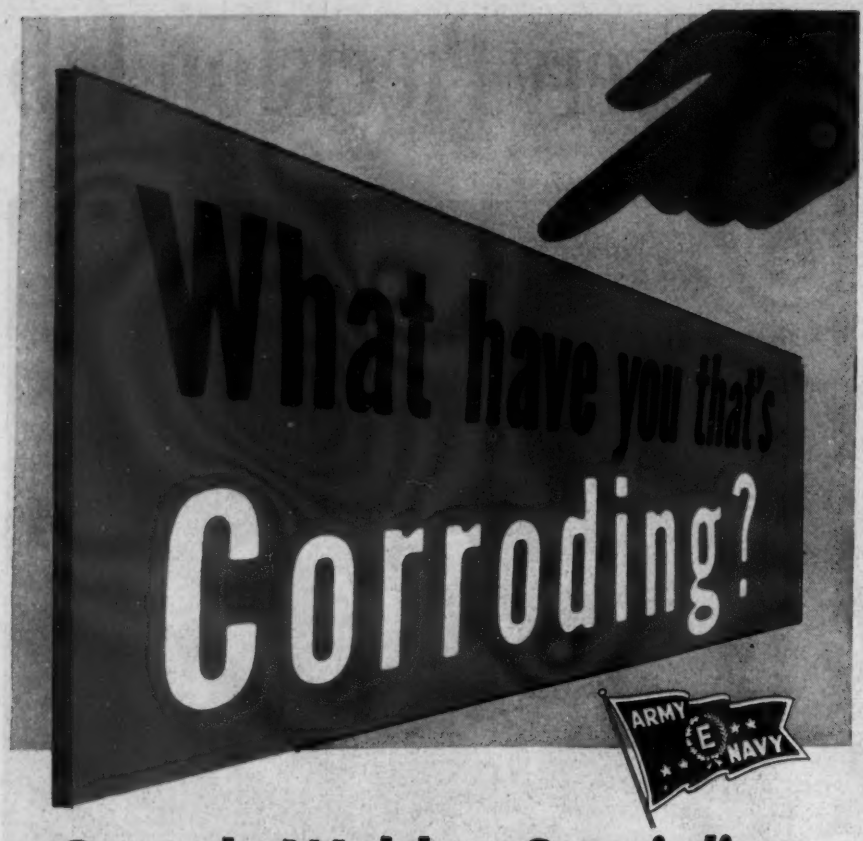

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insecticide dispensers are allowed to cool to nearly room temperature. Then they go to the final station where the small pierced hole (seen at C, Fig. 1) is sealed by filling it with a low melting point alloy. Electric soldering irons are employed to apply the fusible alloy which has a melting point of 201° F.

Purpose of this safety "plug" is to provide a means for releasing the pressure in the container if for some reason or other its temperature should rise above the 201° F. Such high temperatures would volatize the Freon in the container and cause excessive pressure to be built up with the possibility of a dangerous explosion ensuing, unless released. Other types of insecticide containers employ extremely thin pressure disks designed to rupture as dangerous pressures are developed.

Postwar Redesign: After the war when they become available for civilian use, insecticide dispensers like those shown here are expected to find an extremely large market because of the greatly improved effectiveness of the new insecticides and this method of dispersing them in the air.

To lower the cost of the container, it is expected that the design will be changed somewhat, although furnace brazing will still be the preferred method of applying the fittings. It is believed possible to manufacture the container charged with enough insecticide to take care of an average size house for a year so that it can be sold at a price around $2 each. Sales are expected to run into huge figures.

Similar enlarged uses of copper brazing in the controlled atmosphere furnace are predicted by Mr. Salkover whose Chicago and New York plants have already turned out huge quantities of mechanical parts for every branch of the armed forces. His company has a War Department Citation for work done in production of tank track links. Many parts for the Chemical Warfare Section have also been produced.

R. J. Rainier, manager of the New York plant, reports wide use of furnace brazing in the assembly there of many thousand insecticide containers differing only slightly in design from those described here.

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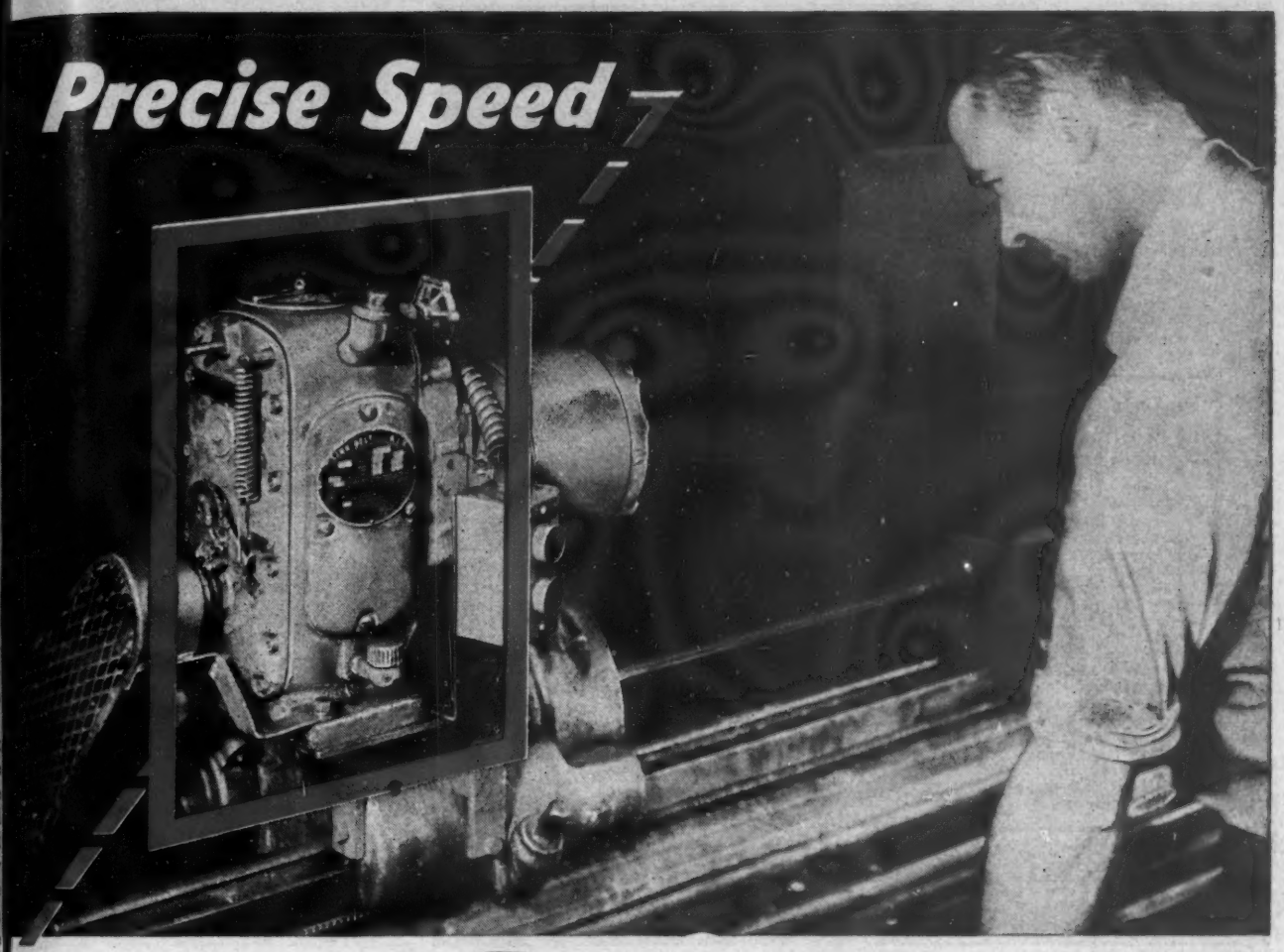

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The Electric Furnace Co., Salem, Ohio

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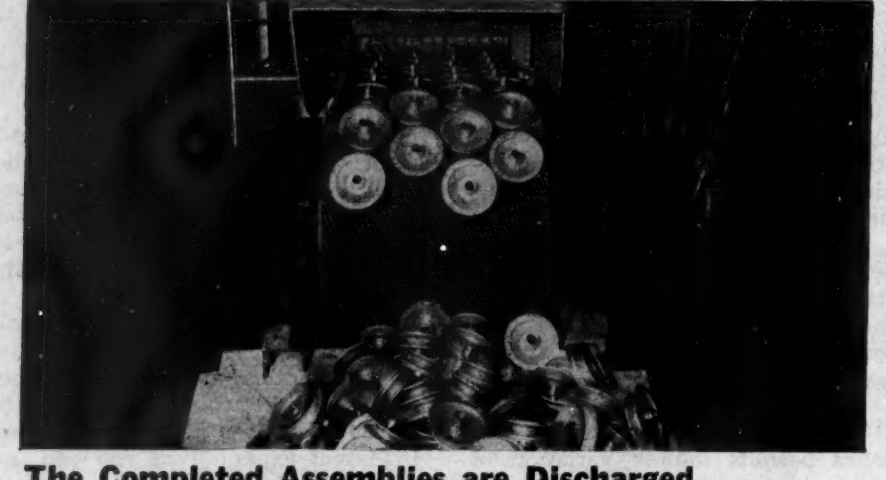

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Aluminum, brass or steel products ranging in size from small intricate assemblies weighing a fraction of an ounce up to large assemblies weighing several pounds are being neatly and securely joined in EF continuous and batch type brazing and soldering furnaces.

Strong, leak-proof joints are made and the completed units are discharged from the furnace—clean and bright. Any number of joints in the same product or any number of pieces can be joined at one time.

Investigate EF Furnaces for Joining Your Aluminum, Brass, Copper or Steel Parts

Send for printed matter showing various types of EF Brazing Furnaces.

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces—For Any Process, Product or Production

Guns "Canned"

(*Concluded from Page* 113)

hauling and reapplying preservative. Since conventional storage requires that be done every year or so and since the new container is expected to be good for 50 years or more, this development presents an important advance in storage methods. Of course, the same procedure is suitable for open-field storage of presses, machine tools, and other plant equipment for similar extended periods.

Significance of the new container is that the original type made of ½-in. thick steel plates resulted in an extremely heavy structure, necessitated by lack of any breathing facility such as is incorporated in the new container. Being hermetically sealed, the original design required the use of the heavy plate to resist expansion and contraction of the gas in the container, as each change in temperature and humidity resulted in an increase or decrease in pressure exerted against the walls of the container.

By providing the "breather" for use in the new units, air is expelled or sucked in with temperature and humidity changes so the extremely light and inexpensive aluminum sheet construction is entirely suitable.

It has been suggested that this method of open-field storage could well be utilized to preserve much of our special machine tools and other production for practically nothing else but of immense value in a national emergency.

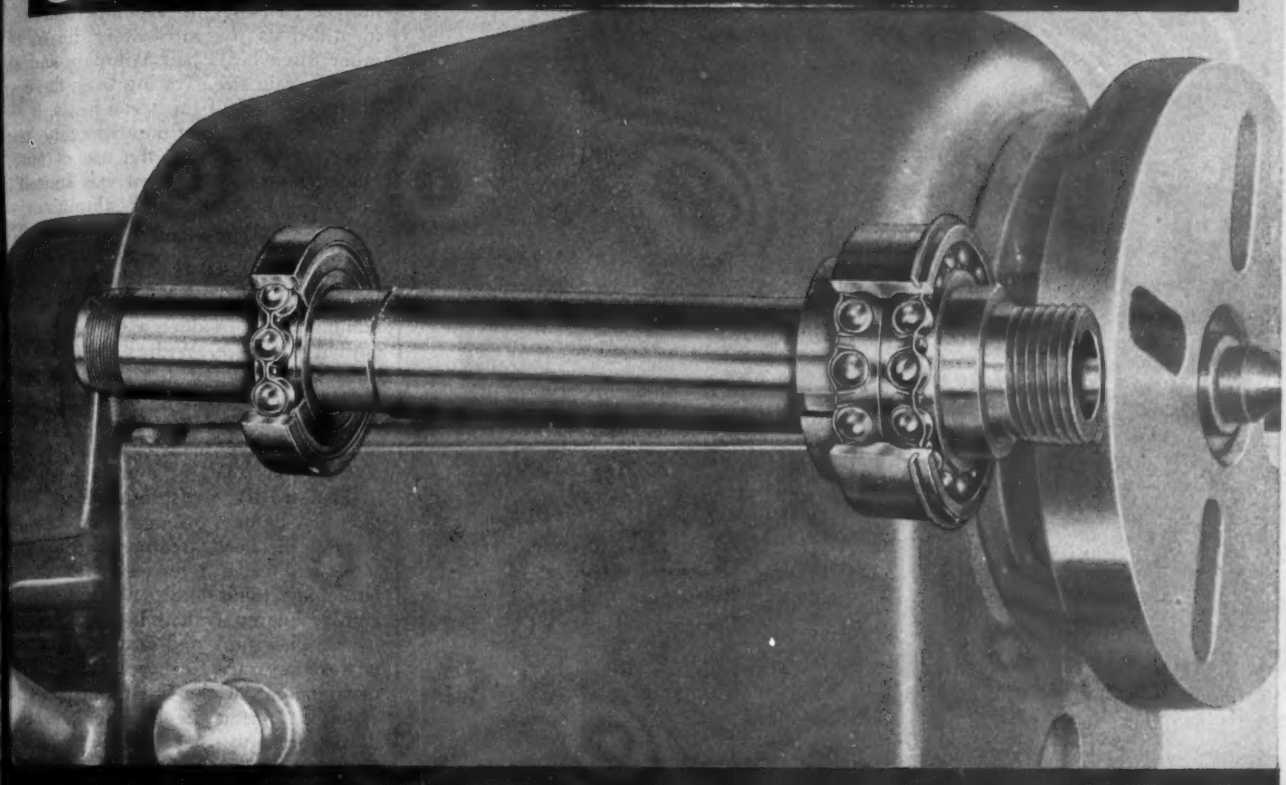
New Shock Absorbers Tested on Freight Cars

With rail freight equipment being pushed to the limit of usefulness because of reconversion demands, problems of wear and goods spoilage have been emphasized to a greater extent than ever before. Experimental direct-action two-way hydraulic shock absorbers for freight cars are being tested on refrigerator and tank cars for the purpose of reducing losses in food and other merchandise in transit, and to save wear on the cars themselves.

The freight car shock absorbers, made by Monroe Auto Equipment Co., Monroe, Mich., are similar in design and type of mounting to those used successfully on new streamliners and other passenger equipment. They are mounted on the outside of the freight car truck between bolster plank and the spring plate, and do not take the place of or any part of one set of springs. Full spring action thus is retained to give a freer type of ride.

Tests so far have shown that the two-way hydraulics cut bottoming to a minimum and control rebound as well. Taking the shock load off the bearings of the freight car trucks, the new two-way shocks act to lessen wear on other parts of the car — including springs, brakes, wheels and axles — and thus effect substantial reductions in maintenance costs.

Logan A NAME TO REMEMBER WHEN YOU THINK OF BETTER LATHES



No. 200
Screw Cutting
Lathe

No. 825 Cabinet Model
Quick Change Gear Lathe

SPECIFICATIONS common to all Logan Lathes: Swing over bed, 10½", Bed width across ways, 6-15/16", Bed length, 43⅛", Size of hole through spindle, 25/32", Spindle nose diameter and threads per inch, 1½"—8, 12 Spindle speeds, 30 to 1450 r.p.m., size of motor, ⅓ or ½ h.p., 1750 r.p.m.; Preloaded precision ball bearing spindle mounting; Drum type reversing motor switch and cord; Precision ground ways, 2 prismatic "V" ways, and 2 flat ways.

Higher Cutting Speeds Without Bearing Adjustment on *Logan* LATHES

THE pre-loaded ball bearing spindle mounting is one of the advanced design features which make Logan Lathes specially adapted to the needs of modern shops. With the resulting increased spindle speeds, full advantage can be taken of the high cutting speeds used with carbide cutting tools. No bearing adjustment is required within the full range of Logan spindle speeds, from 30 r.p.m. to 1450 r.p.m., regardless of the cut being taken. With Logan Lathes, consequently, the precise factory alignment of the spindle is not disturbed by periodic bearing adjustments, and original spindle accuracy is sustained. Grease-sealed, the ball bearings require no further lubrication or attention throughout their long service life. Maintenance costs and down time are kept at a minimum. The ball bearing spindle mounting is another reason why Logan Lathes increase output and decrease unit costs on production lines, and reduce the man-hours per cutting job in tool rooms. For full information on all models of Logan Lathes, see your nearest Logan dealer, or write direct for descriptive catalog.

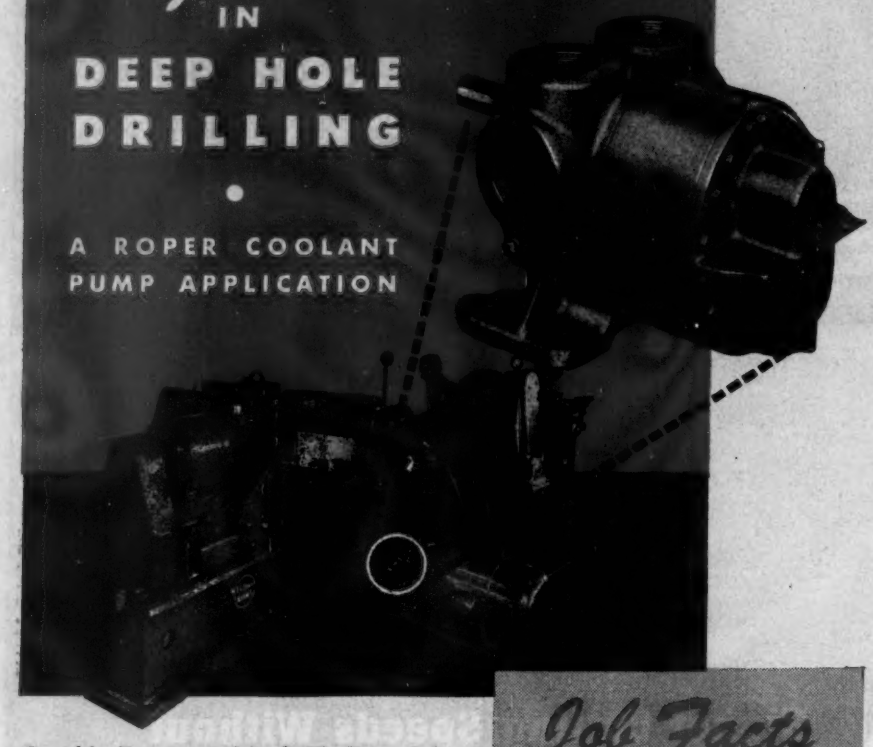
F-1

LOGAN ENGINEERING CO.

CHICAGO 30, ILLINOIS

SOLVING A *Chip Problem* IN DEEP HOLE DRILLING

A ROPER COOLANT PUMP APPLICATION



On this Roper equipped W. F. & John Barnes deep hole drilling machine, the solution to maintaining speedy production involved a two-fold pumping problem. The first and important objective called for sufficient coolant pressure to wash out chips through the V section of rifle drills. The second problem of equal importance required adequate safeguards to insure long pump life and efficient performance. The success of this Roper application, worked out in collaboration with Barnes' engineers, is indicated by the excellent war production record of this modern machine tool. Eight deep hole drilling operations are handled simultaneously . . . cycle time 1.68 minutes . . . machining time cut from 60 minutes to 1.8 minutes on magnesium aircraft engine housing. Perhaps Roper engineers can suggest a solution to your pumping problems. Service offices in principal cities.

GEO. D. ROPER CORPORATION
ROCKFORD, ILLINOIS

Job Facts

Functioning as an integral part of the machine, this Roper Rotary pump supplies a steady stream of coolant through eight rifle drills . . . sizes range from ⅛" to .5649". As illustrated above, coolant enters manifold, passes through small (smallest .025") hole in drill, chips are washed out through V section. Pump has rated capacity of 35 g.p.m., relief valve set at 150 pounds. Powered by individual 10 H. P., 1200 R.P.M., 220-440 volt, 60 cycle, 3 phase motor.

FREE ENGINEERING SERVICE

A staff of competent experienced Roper engineers are ready and willing to help you solve your pumping problems. There is no obligation. Simply send us details of your problems, or get in touch with Roper field engineers located in principal cities. Roper Catalog contains addresses of representatives.

Send for Catalog and Booklet "How To Solve Pumping Problems" No. 9-48

Get factual information today on pumps and pumping problems. Ask for free catalog and booklet.

PUMPS ESPECIALLY ENGINEERED TO FIT YOUR REQUIREMENTS

ROPER *Rotary Pumps*

BUILDERS OF PUMPS FOR MANUFACTURING, MARINE, PETROLEUM, AND PROCESS INDUSTRIES

Modern Heat Treating

(*Continued from Page* 116)

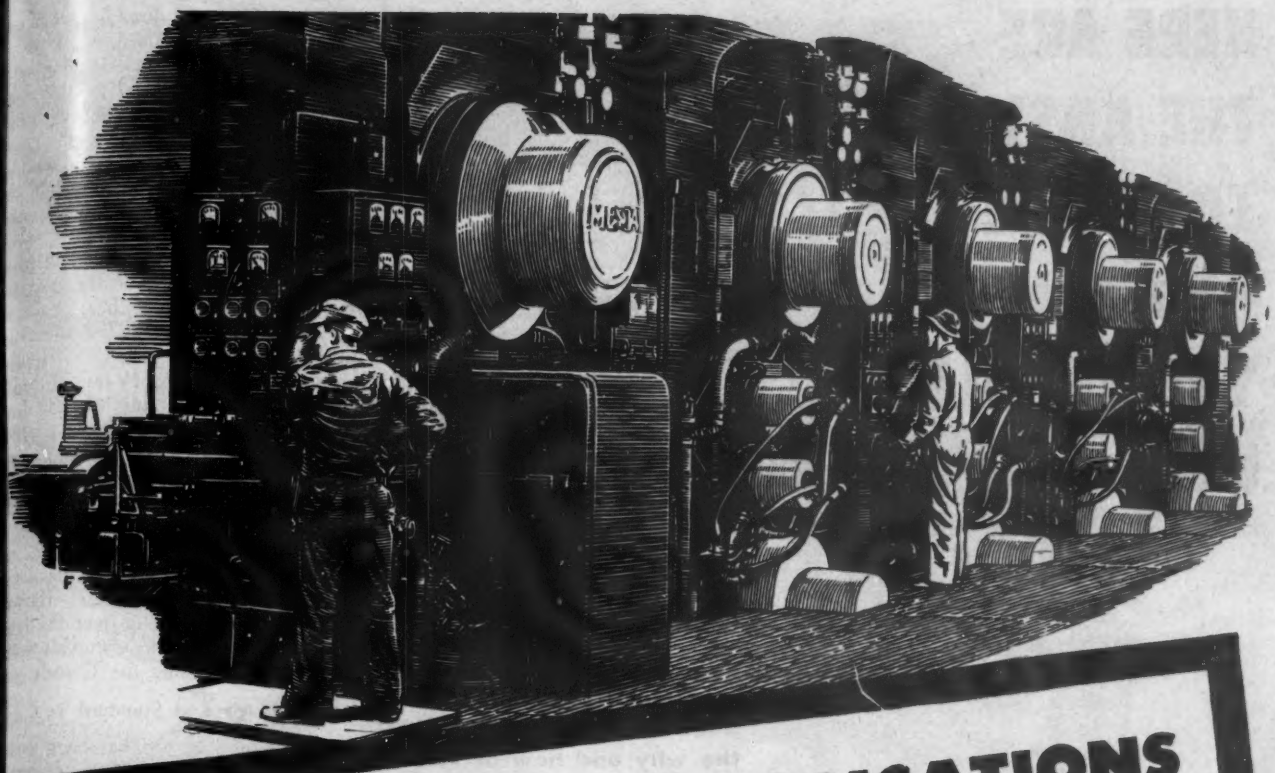
other heats. McQuaid-Ehn Tests were run on these heats of which four showed normal coarse-grain structure and were identified as the satisfactory heats; the other three heats had a duplex and abnormal grain size. Tracing back the open-hearth practice of the seven heats, it was found that the three unsatisfactory heats were deoxidized with the use of aluminum. Research work then was started to determine the effect of aluminum on grain size and normality of the steel. The results of this work were that a small amount of aluminum produced a coarse-grain normal steel. Adding still more aluminum would produce a duplex and abnormal structure. With still further addition of aluminum, the structure would be fine-grain normal.

The use of fine-grain normal steel was found to have many advantages over coarse-grain steel. Fine-grain steel used in heat treated parts resulted in higher ductility, impact strength and less distortion in heat treatment. Fine-grain steels are often referred to as shallow hardening steels and have less hardenability. For equivalent hardenability between fine-grain and coarse-grain steel it was necessary to increase the manganese content of the fine-grain steel. For example, spring steels when furnished coarse grain were specified carbon 0.80-0.95 per cent and manganese 0.25-0.5 per cent. The fine-grain steels were changed to carbon 0.80-0.95 per cent and manganese 0.60-0.90 per cent. Today grain size is an accepted quality of commercial steels and has been adopted and published by ASTM. Charts classifying the various grain sizes, numbered 1 to 8, are published in many technical and reference books.

Inherent austenite grain size may also be judged by the fracture of a piece of steel after hardening by quenching. Such fractured grain-size standards known as Shepherd Standards consist of 10 samples rated 1 - 10, inclusive. Microscopically they conform substantially with the grain sizes as rated by the ASTM chart. The Shepherd P-F or penetration-fracture is a comparison test for both hardenability and grain size. It is used mostly on steels which have a well-defined border between case and core, such as carbon tool steels.

Jominy End-Quench Test

The Jominy end-quench test was first described by A. L. Boegehold and W. E. Jominy in 1937. This method of measuring hardenability consists of cooling one end of a 1-in. round with water and measuring the hardness from the water-cooled end. The quenching fixture is mounted so that a column of water at 75° F, plus or minus 5°, is directed against the bottom face of the hot test piece. The water passes through an opening ½-in. in diameter and is under sufficient pressure to rise to a height of 2½ in. above the opening before the specimen is placed in the fixture. (STEEL, May 17, 1943, p. 106, for c



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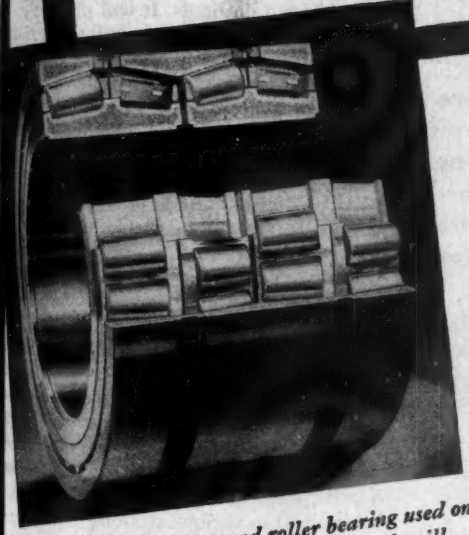
...AND OTHER HEAVY-DUTY JOBS



Torrington 4-row tapered roller bearing used on the roll necks of the Mesta five stand mill... 12" bore by 17¼" O.D.

The mill you see above delivers 3200 feet of cold strip per minute. That means high R.P.M. on the roll necks... speeds and heavy loads handled efficiently by Torrington 4-row tapered roller bearings. Made of S.A.E.-3310 steel (with higher nickel content) for maximum service life, the bearings have the additional advantage of simple design.

On reels, screwdowns and edgers... on work rolls, back-up rolls, shears and drives... on table rolls, pinion stands and other steel mill equipment... bearings designed and built by Torrington's Bantam Bearings Division are also meeting today's anti-friction requirements.

In the competitive days coming, you should be "backed up" with that kind of performance from *your* steel mill equipment. For maximum roll neck diameters, bearings of all tapered types can be supplied with proportioned cross-section. And our engineers will gladly help yours to incorporate Torrington Bearing advantages in your designs.

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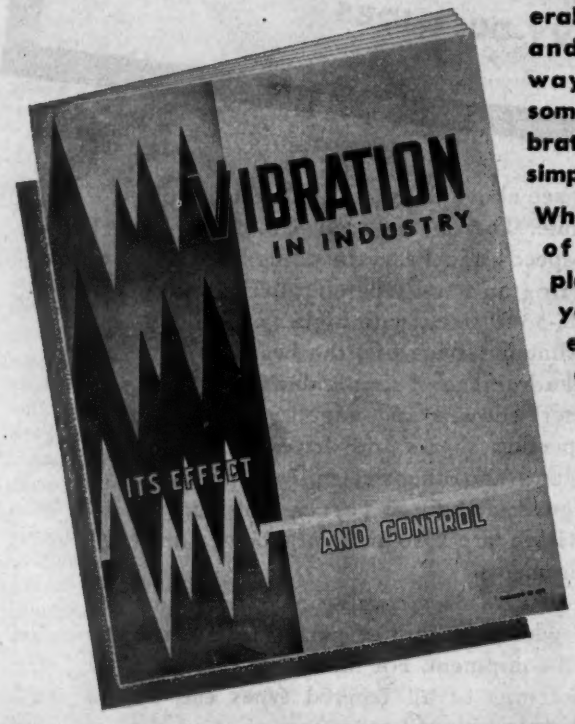
Send for this new 12-page booklet explaining the why and how of vibration control. Vibration can result from several sources in any plant and be costly in many ways. Here are shown some typical causes of vibration together with the simple method of control.

Whether you are aware of vibration in your plant or not, it will pay you to study this interesting booklet. Write and ask for Catalog SP-650.



KORFUND
VIBRATION CONTROL

THE KORFUND COMPANY, Inc., 48-37 32nd PL., LONG ISLAND CITY 1, NEW YORK

plete description of Jominy test in u

In performing this test, water supp is shut off with a quick-opening valv the hot specimen placed in the fixtu over the water pipe so that its bott is ½-in. from the opening of the nozz and the water quickly turned on. Th sample is kept on the fixture until co or for at least 10 min, and then quench in water until cold.

Test bars should be normalized b heating to 150° F above the Ac_3 poi and holding 30 min at heat. Followin this treatment, the bar is finish-machine and heated for hardening to 75° F abov the Ac_3 point, holding 20 min at heat. order to minimize scaling, the bar shou be heated in a small closed contain having a layer of cast iron chips abo 1-in. deep.

After quenching the fixture, two fl surfaces, 180° apart, are ground 0.01 in. deep on the side of the bars, ca being exercised not to heat the bar as to affect the hardness. Hardne readings then are made over the leng of the bar at 1/16-in. intervals with rockwell tester, using the C scale.

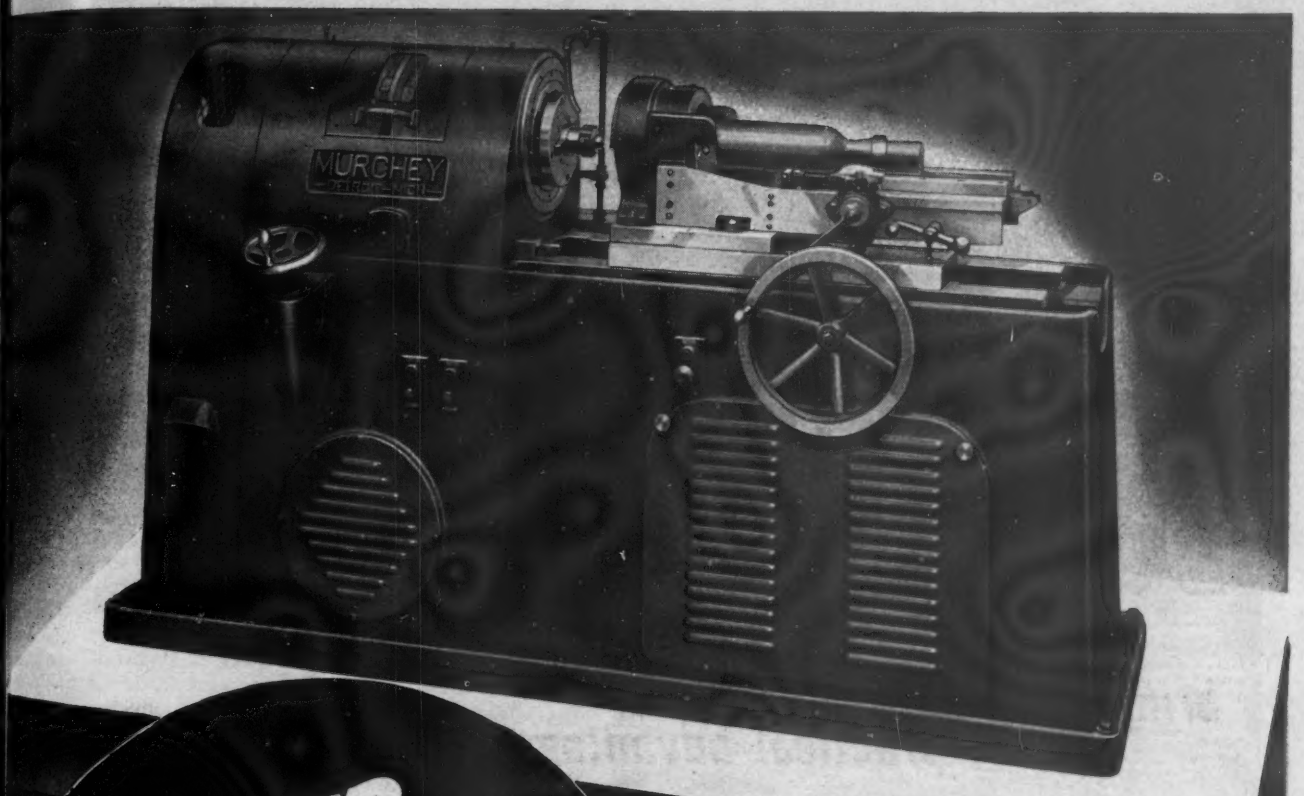
Accepted as Standard Test

This method of test has been used successfully that it has been accepted a standard test by the steel industry an the AISI; also it has been proven as method that laboratories can use to chec with each other closely. Many heat trea ing plants have adopted the end-quen as a routine test of different heats parts required to have hardenabili within certain limits. It will predict in a vance how the steel will respond heat treating. For the past few ye the test has been used with a fair d gree of success as a method for dete mining which of the so-called alterna or NE steels can be substituted for t old SAE steels.

The Jominy test is now proposed as means of specifying the hardenability f heat treated steel. When the harde ability band is specified, the chemic composition limits have been modifi somewhat from the limits applicab to the same steels as specified by chem cal composition only. At the pres time the test is the simplest and m practical method for testing harde ability; further, it can be interpolat to Grossmann's (D_1) critical diamet and prediction of the hardness to obtained in various sections can be ma

M. A. Grossmann, M. Asimow and F. Urban have contributed some va able work on hardenability and quen ing. Their paper "Hardenability, Its R lation to Quenching, and some Quan tative Data" (ASTM-1938), presents method of determining the critical d meter (D_e), which is a measure of ha enability, and of the H-Value, a meas of the severity of quench. The knowle of these two factors makes it possible calculate a standard ideal diameter (from which a variety of useful pre tions is made possible from quenchi

Consider Fig. 9, a diagrammatic rep sentation of a series of etched cr sections of an SAE 3140 steel quenc



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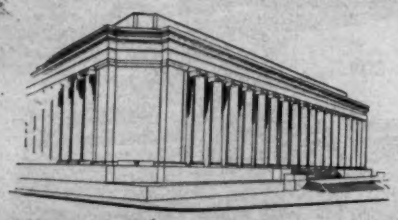

SCAIFLUX

SILVER ALLOY BRAZING FLUX

brings you these practical advantages-

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Your brazing work goes faster with SCAIFLUX because this advanced product is effective over a wide temperature range, is readily applied and the residue is easily removed.

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Having a low surface tension, SCAIFLUX permits close tolerances and more accurate results. It is non-corrosive and does not develop gas phase in joined areas.

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SCAIFLUX becomes an adhesive liquid when preheated to 160°F, is active at temperatures from 900°F to 1650° F. This simplifies your brazing procedure.

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in oil, and a series for the same steel quenched in water. This illustration shows two well-known facts: (1) Depth of hardening becomes less as the bar diameter is increased, using the same quench; and (2) with the milder oil quench, size of the unhardened core increases more rapidly with increase in bar diameter than is the case with the more severe water quench. This relative increase of unhardened core is highly characteristic of the severity of a quench.

Determining Critical Hardness

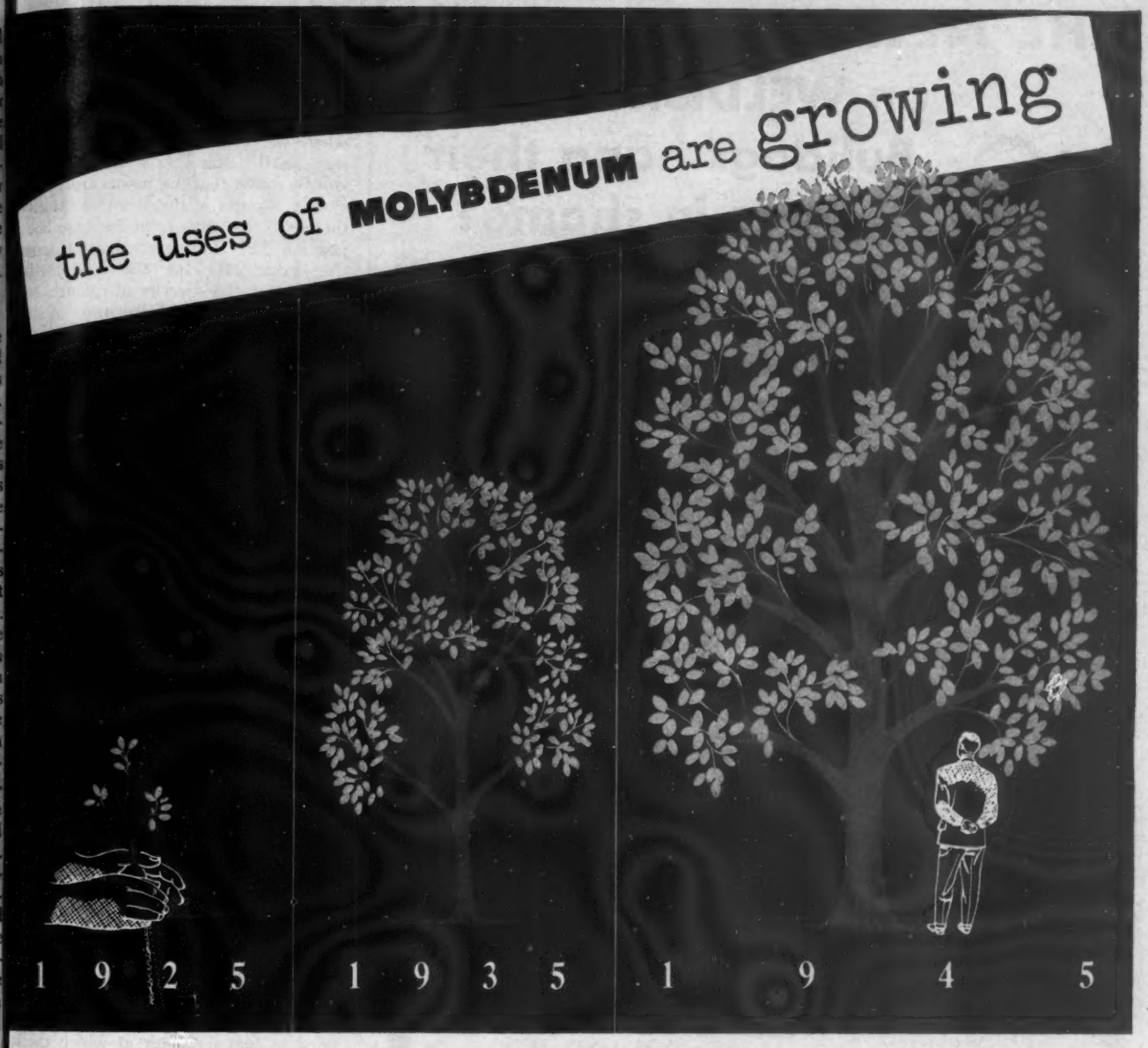
When a bar is quenched from the austenitic state to harden, it is found that the inner portion of the bar is less fully hardened than is the outer portion. Microscopic examination of the cross-section would show the outer zone martensite and as the hardness drops off, the amount of martensite decreases and nodular pearlite or primary troosite increases. At some point there are approximately equal parts of both constitutions. This point at which there is 50 per cent martensite and 50 per cent pearlite is called the critical hardness. A rockwell hardness survey of the same bar would show that the inner portion of the bar is less fully hardened than the outer portion. If the hardness is plotted in a hardness-traverse curve, the familiar U-curve generally results, from which the critical diameter can be determined from the curve shown in Fig. 10.

Another method of determining the critical hardness is to etch a polished cross-section of the bar in 1 to 1 HCl. The different rate of etching of martensite and pearlite will show a demarcation between the martensitic rim and pearlite core. Martensitic zone will have a lighter etch than that of the unhardened center. Critical diameter can be estimated quite accurately from the etch test.

By plotting the original diameter (D) as the abscissae (logarithmic scale) and the unhardened diameter (D_u) as the ordinates, from the water and oil-quenched bars (Fig. 11), the curve will show that the slope is controlled by severity of quench. This becomes the basis for evaluating the severity of quench. In the water quench, the 1.83-in. diameter is the critical size, whereas critical size in the oil-quenched bar is 1.25-in. diameter.

In Fig. 9 it is shown that as size of the quenched bar is increased, proportion of unhardened core increases more rapidly with a mild quench than when the quench is more severe. When the data in Fig. 9 is plotted as in Fig. 11, curves are obtained which vary in slope, the degree of slope being characteristic of the severity of quench. To find the numerical value for the severity of quench, a curve so obtained must be moved over the chart in Fig. 7 until it matches one of the curves. To do this a transparent cover-slide of tissue paper or celluloid is laid over chart in Fig. 7 with the bottom edge of the paper or celluloid coinciding with the lower edge of the chart.

Plot the points on the right-hand curve

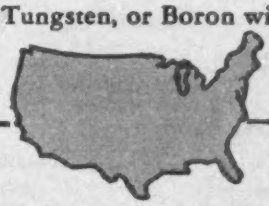


All types of work will be included, but special emphasis will be on those using metals."

So reads a paragraph in a recent Government report. It relates to modernization of commercial buildings, but might apply as well to various departments of industry.

More use of metals. Better metals, of more specialized properties, for particular uses. More precise consideration of serviceability with a view to lower overall cost, in any given employment . . .

All this active search for better utilization of materials in post-war manufacture has enlarged and diversified the uses of Molybdenum. Knowledge of the possibilities is being rapidly advanced. The Molybdenum Corporation maintains a staff of technicians whose advice is often found helpful, and sends out informative literature on request. Inquiries on any proposed use of Molybdenum, Tungsten, or Boron will be welcomed.



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in Fig. 11, placing points A, B, etc. o the cover-slide at the proper position, previously described for Fig. 7. No move the cover-slide to right or lef until the points fall on a single curv or as close as possible. In this case when the cover-slide is moved to th right until point A falls at about 2.6, it will be found that the points are groupe closely around a single curve which i the curve that rises from the base line a position 2.6. This new value 2.6 is now the value HD for the 1.83-in. bar, namely, (H, the severity of quench) multiplied by (D, the diameter of bar). Therefore, to obtain the H-value, we have

$$H = \frac{HD}{D} = \frac{2.6}{1.83} = 1.4$$

which is the numerical value for H severity of this quench. The oil quench then has a severity of quench H = 0.41.

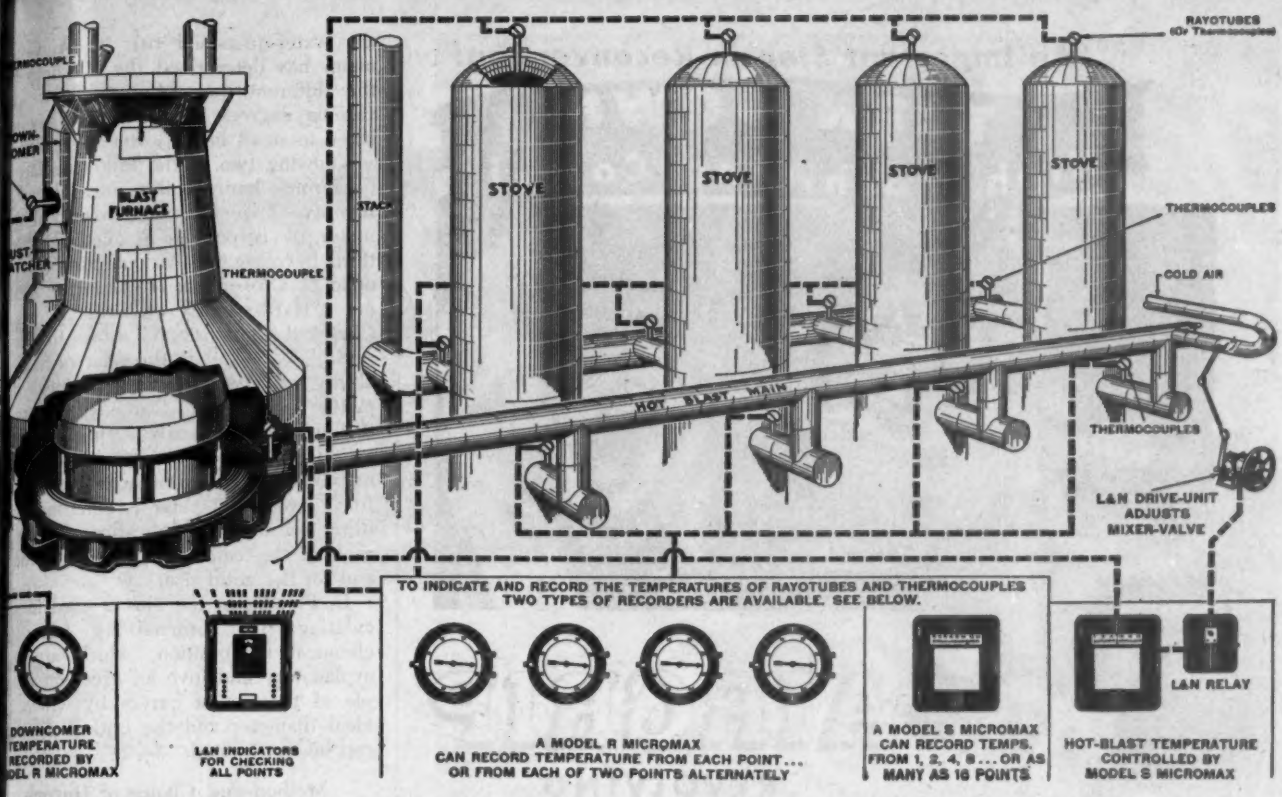
Instead of measuring the unhardened diameter (D_u) on etched cross-section it is equally valid to ascertain the diameter, D_u from the transverse-hardness curves. The boundary of the unhardened core is at the point of the critical hardness. It can be measured from the slope as shown in Fig. 10.

Choose Curve to Fit

To determine H-value from hardness-distribution curves (Fig. 7), always select hardnesses where the curves are steep as the flat portions lead to inaccuracies. Also, never determine H-values from only two sizes, since any slight discrepancies become greatly exaggerated in matching curves. Always use four or more sizes and choose the curve which fits the points most closely.

Knowing the critical bar diameter (D_c) of a steel and the severity of the quench (H-value), it is possible from the curves in Fig. 12 to calculate the ideal diameter (D_i). The ideal diameter has been defined as that diameter at which the unhardened core would disappear if the piece were quenched with the severest possible quench, termed "ideal quench" with H-value infinite. This ideal diameter value is used as the basic reference for defining hardenability. In Fig 12, the ordinates at the left are marked D_c values, and these refer to the actual critical size as found in the test. The abscissae as marked at the bottom are called D_i values, indicating the critical size which would have been obtained had the quench been ideal, H-value equals infinite.

In the case of SAE 3140, where critical diameter for the water-quench bar D_c equals 1.83, follow the horizontal line until it intersects the incline line which at its upper right-hand end is marked 1.4. From this intersection, follow down to read the D_i value at the bottom of the page and it will be found that the ideal diameter (D_i) equals 2.5. The oil-quench SAE 3140 bar—which has a critical diameter of D_c equals 1.2 and a severity of quench of H-value equals 0.41, it will be found the ideal diameter is D_i equals 2.66. This is considered a reasonably-close check w


RAYOTUBES
STOVE
STOVE
STOVE
STOVE
STACK
BLAST FURNACE
THERMOCOUPLE
THERMOCOUPLES
COLD AIR
HOT BLAST MAIN
THERMOCOUPLES
L&N DRIVE-UNIT ADJUSTS MIXER-VALVE
TO INDICATE AND RECORD THE TEMPERATURES OF RAYOTUBES AND THERMOCOUPLES TWO TYPES OF RECORDERS ARE AVAILABLE. SEE BELOW.
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DOWNCOMER TEMPERATURE RECORDED BY MODEL R MICROMAX
L&N INDICATORS FOR CHECKING ALL POINTS
A MODEL R MICROMAX CAN RECORD TEMPERATURE FROM EACH POINT... OR FROM EACH OF TWO POINTS ALTERNATELY
A MODEL S MICROMAX CAN RECORD TEMPS. FROM 1, 2, 4, 8 ... OR AS MANY AS 16 POINTS
HOT-BLAST TEMPERATURE CONTROLLED BY MODEL S MICROMAX

COMPLETE TEMPERATURE CONTROL FOR THE BLAST FURNACE

The diagram above shows how Micromax Pyrometers are used today to give complete control of temperature in the operation of blast furnaces. Installed at a convenient point, on a panel which centralizes all data about furnace operation, these Micromax instruments represent the best modern practice in temperature-control of a process which has "always" used many L&N Pyrometers.

A high light is the regulation of hot-blast temperature in such a way that the blast remains at a *steady* temperature. After a brief leap upward when a fresh stove is put "on air", the blast returns promptly to temperature. Without undershooting or cycling, it settles to the control point and stays there, supplying blast at the uniform temperature so desirable in making today's uniform cast iron and steel.

Another and more recent high light of Micromax instrumentation for blast furnaces is the use of Rayotubes, instead of thermocouples, for detecting stove-dome temperatures. The hot, chemically-reducing gas cannot affect Rayotubes, and the design worked out especially for stove domes is very satisfactory in the installations now operating.

Further information will be sent on request.

Part of Blast Furnace Control Panel of Iron & Steel Division, Kaiser Co., Inc., Fontana, Calif. Shown are Strip-Chart Micromax Recorders for stack and stove temperatures, and a Round-Chart Controller for the hot blast.

LEEDS & NORTHRUP COMPANY, 4957 STENTON AVE., PHILA., PA.

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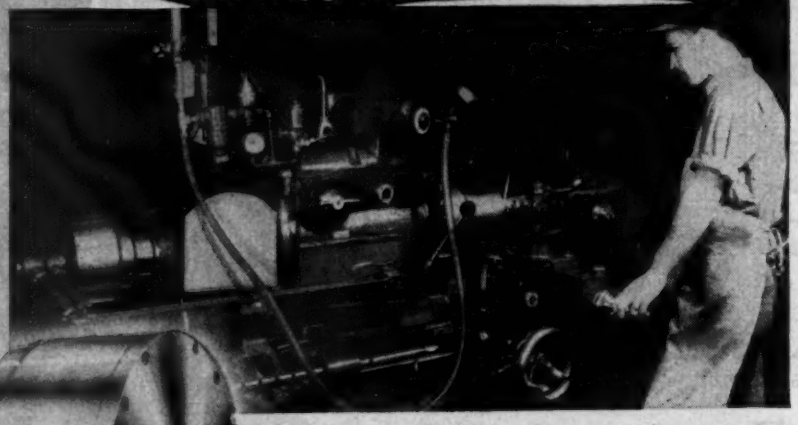

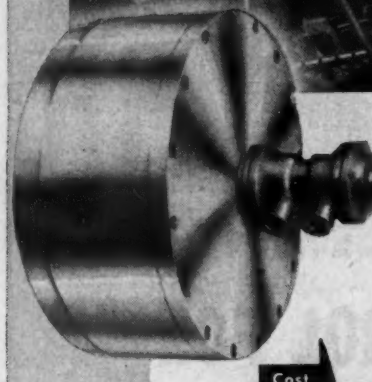

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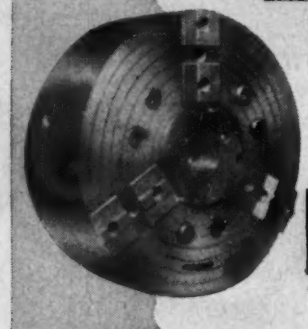

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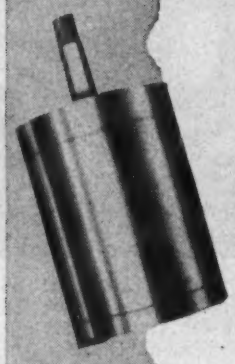

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the water-quenched bar. M. A. Grossmann has determined the H-values for the different quenching mediums with various degrees of agitation. They are listed in small table, lower right, Fig.

Knowing two of the following facts concerning hardenability, ideal diameter, severity of quench, or the critical diameter, it is possible to determine the third by using the various curves developed by Grossmann. His report to AIME on "Hardenability Calculated from Chemical Composition" shows that it is possible to calculate the relative hardenability of steel in terms of ideal diameter with a fair degree of accuracy if the complete analysis, including the residuals — such as chromium, nickel, molybdenum and grain size—are known. Ideal critical diameter is determined by using various multiplication factors for each of the common chemical elements and for the grain size.

In Fig. 8 are the curves used in calculating the hardenability from the chemical composition, which are self-explanatory and give an excellent example of the use of curves by which the ideal diameter and the critical diameter can be determined.

Method and Choice of Quench

The method and the choice of quenching media are just as important as heating for hardening. The selection of the quenching medium is determined by the steels to be treated, the size and shape of the pieces and the properties desired. In other words, each steel has a critical quenching rate which will harden the surface as well as part of the interior to a definite depth when a piece of a certain size is quenched. A lesser or greater depth of hardness penetration will be obtained after a given type of quench. A small piece may harden entirely through its section while a large piece may not harden at all. Both of these results may be objectionable since the smaller piece may be too brittle and the large may be unsuitable because of the insufficient increase in hardness. Under these conditions, it is necessary to choose a quenching medium which will provide a slower rate of cooling for the smaller piece, while the larger piece will require means for more rapid cooling, unless the proper steel is selected.

There are two universally used liquid quenching media, namely water and oil. Water provides the fastest cooling rate attainable in practice and one which closely approaches the theoretical maximum. It is fast enough to harden under ideal conditions the surface of even very heavy sections of plain carbon steels. It is, nevertheless, a temperamental medium requiring numerous precautions to secure uniform hardening. Water quenching properly applied to the carbon and low alloy steels, commonly designated as shallow hardening steels, in which a thin hardened layer is produced by virtue of the extremely fast surface cooling obtained in water. This hardened surface layer causes a stress condition. Carbon steels in complicated or unsymmetrical sections cannot be water-hardened with

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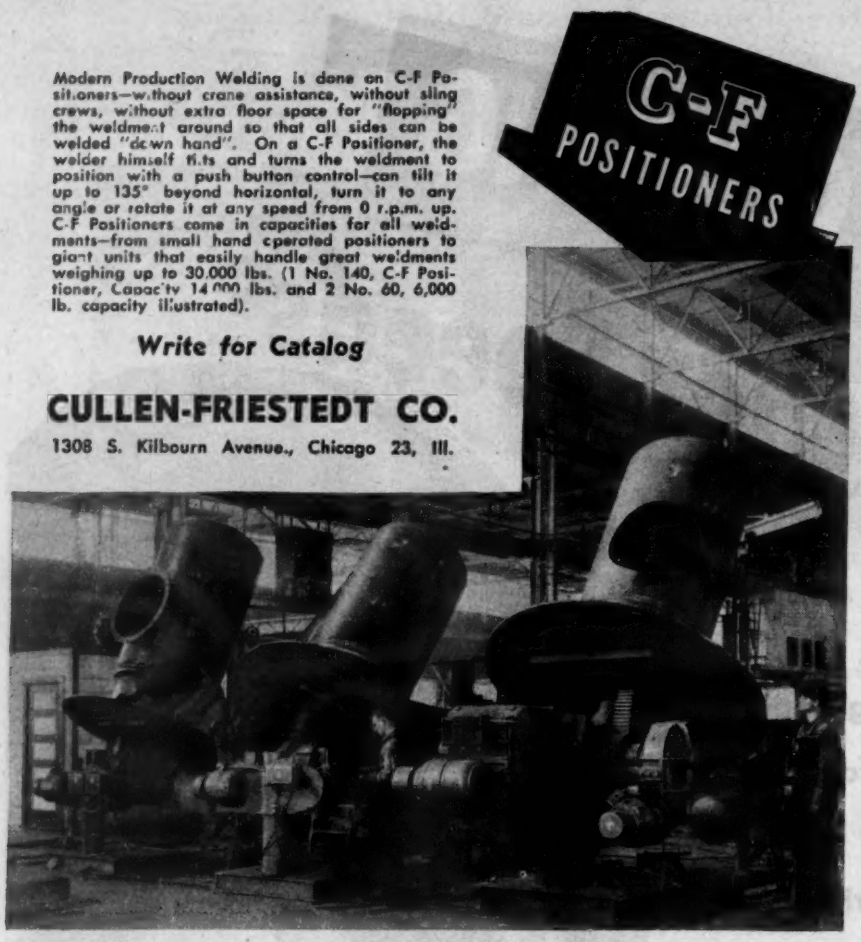

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out excessive distortion or danger of cracking. Oil quenching reduces but does not always eliminate distortion, because cooling is still relatively fast and temperature gradients correspondingly large. Consequently, complex shapes, such as blanking dies, must be hardened with a still milder quench; namely air or salt quench.

Three Stages of Quenching

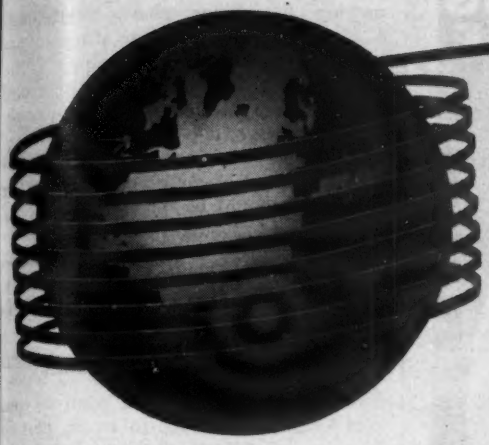
Cooling of a red-hot object by immersion in water occurs in three distinct stages, and understanding of which is essential for coping with the problems of water quenching.

The first stage, beginning immediately upon immersion, is characterized by the formation of a complete vapor envelope about the hot object. Heat transfer is by radiation and conduction through this vapor film. It is therefore relatively slow and persistence of this stage is highly undesirable. Secondly, there ensues a collapse of the vapor film and wetting of the steel surface by the quenching liquid accompanied by active boiling. Here cooling is very rapid, heat is carried away by large masses of steam and deposited at a distance by the recondensing vapor, and the unique cooling powers of the water quench are realized. Eventually the surface temperature of the immersed work falls below the boiling point of the aqueous medium, the second stage of cooling ceases, and cooling proceeds by liquid conduction and convection. This is the final stage, in which cooling again is relatively slow and proceeds to temperature equilibrium.

Persistence of the initial vapor stage or of localized vapor masses in the second stage will cause slow cooling of the affected areas and permit the incidence of the pearlite transformation and soft spots. This is a common difficulty encountered with water quenches.

Water Quenching: Two counteractive measures immediately suggest themselves; namely, the use of a cold bath to shorten the life of vapor formations, and agitation, such as in a submerged spray quench, to dislodge these same obstructions. However, the most generally useful expedient is the addition of an inorganic solute to the quenching bath. The two most common and effective agents are common salt and caustic soda. An addition of 9 per cent of the former has been found optimum for this purpose, and 3 per cent of caustic soda has equivalent effectiveness.

These additions, by their release from solution during vaporization and the subsequent explosive decrepitation of the minute crystals at the hot work-surface, destroy the stability of vapor films and thereby promote rapid early cooling. However, increasing amounts of these agents progressively lower the cooling rate in the second quenching stage and therefore should be used in the given concentrations for maximum efficiency. It can be seen that a brine bath is not an infinitely severer quench than plain water, as is often supposed, but that the salt addition merely permits full use of the cooling power latent in water By re-



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THE two 8-cylinder Cooper-Bessemer Diesels shown below have been in constant operation for 17,000 hours. Thus piston travel alone, in each of the sixteen cylinders, exceeds the equivalent of a non-stop trip eight times around the earth!

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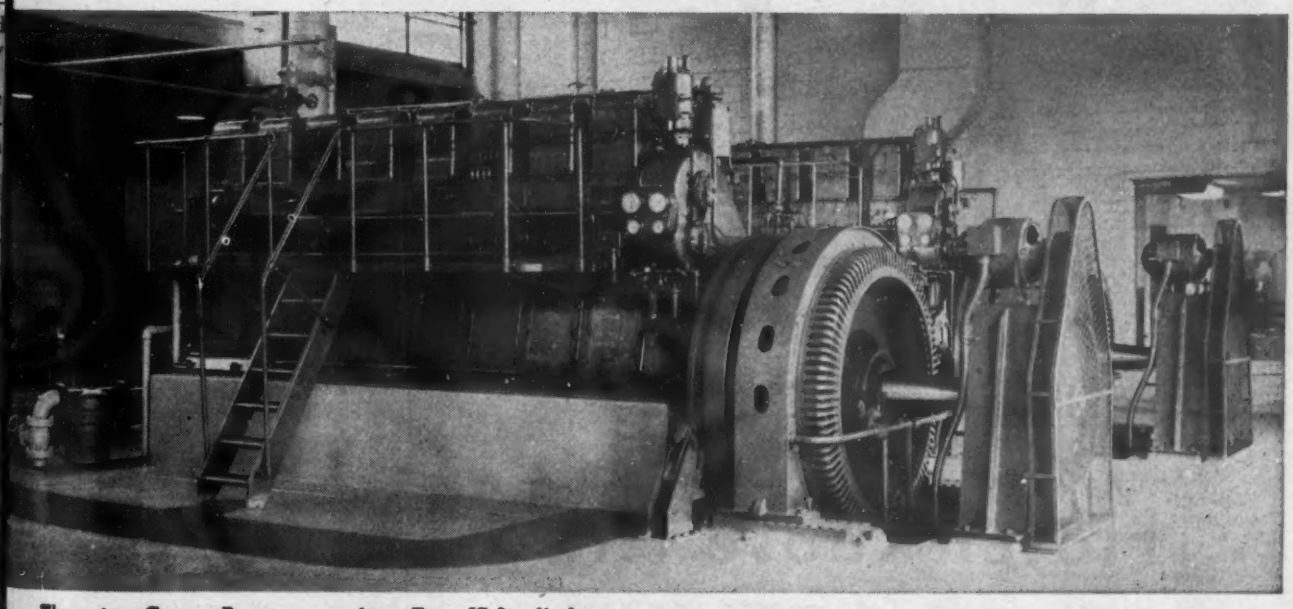

These two Cooper-Bessemer engines, Type JS 8-cylinder 600 hp diesels, are installed in the R.E.A. Tri-County Electric Cooperative at Portland, Michigan. Under the supervision of Mr. S. Don King, Superintendent, they have piled up 17,000 continuous operating hours without repair and with no indication that any maintenance whatever is needed.

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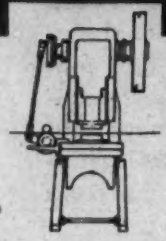

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moving the vapor phase interference.

The other major problem attendant upon the use of water quenching is the generation of high stresses in the cooled article. These stresses may lead to cracking or warpage, depending upon the size and shape of the work. Changes in section thickness of an object to be water quenched should be held to a minimum, and, where unavoidable, should be in the form of a gradual taper or a generous fillet. Sharp re-entrant angles lead to stress concentrations and very likely failure by cracking.

Critical Sizes Apt to Crack

Even uniform sections, such as perfect cylinders, are apt to crack, particularly in certain critical sizes. This is due to the magnitude of the residual stresses remaining in the steel as a result of its martensitic transformation in the presence of a steep thermal gradient during the latter part of the water quench. In the case of large sections, where hardening penetrates only to a limited depth and a soft core remains, the condition of the surface stress is generally not harmful, but actually beneficial, since residual stresses are compressive and tend to counteract tensional service stresses. However, a water-quenched part which hardens completely through has a state of residual tensional stress at the surface, the value of which may be exceedingly high and often leads to cracking of the work even while still in the quench, or at some time thereafter. The tendency of water-quenched steels to crack in certain critical sizes is generally insurmountable when the critical conditions exist, and recourse to oil, salt or air-hardening steels is the most economical way out.

Certain devices are sometimes utilized in an effort to avoid this fatal cracking, such as attempts to lessen the severity of the water quench by certain solute additions, or the withdrawal of the quenched part from the bath while still hot and immediately tempering, etc. Such practices are rarely consistently satisfactory, and it has often been demonstrated that substitution of oil hardening or even air hardening steels in such cases is, in the long run, cheaper than the use of the lower-cost carbon steels with the attendant probability of loss by cracking of a certain percentage of the work.

The use of a compressed air stream as a source of agitation in such quenching tanks is not to be recommended since contact of air with the hot work surface may be as detrimental as the presence of steam. In the case of a caustic soda bath, actual deterioration of its quenching efficiency may result from the use of an air stream, due to accelerated formation of sodium carbonate at the expense of the beneficial hydroxide.

Agitation by properly located and immersed motor-driven propeller blades or by use of directed, pump-driven streams of the quenching medium, are the preferable methods. Agitation should be planned and applied to obtain a symmetrical action on all sides of the

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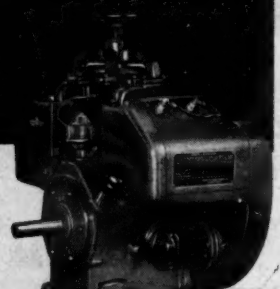

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mersed work: this is particularly important to minimize warpage of relatively slender parts. In this respect a brine quench has the advantage of more uniform action than can be secured by manual or mechanical agitation in a fresh-water bath.

Oil Quenching: Plain carbon steels are oil quenched for full martensitic hardness only in very light sections; for example in the case of knife blades. In larger sizes only partial hardening can be expected. Oil quenching of plain carbon steels is sometimes used in the stress-relieving heat treatment of severely cold-worked parts such as cold-headed bolts. Most commonly, however, oil quenching is applied to moderately or highly-alloyed steels to obtain full martensitic hardening with a minimum of distortion. Such steels may be high-carbon steels for tool applications or case-carburized steels for machinery or constructional purposes.

The initial, slow-cooling vapor stage in an oil quench is generally of longer duration than in a water quench, but since the insulating properties of the oil vapor film are apparently lower than those of a steam envelope, cooling actually occurs somewhat faster in the first stage with the use of oil. For this reason and because of the low critical cooling rate of oil hardening steels, difficulty with soft spot occurrence due to vapor interference is not encountered in oil quenches. Because of the high boiling point of oils, the use of a hot quenching bath does not materially increase the persistence of the vapor stage.

In the second quenching stage the relatively low rate of vaporization of oil gives a cooling power much lower than

Fillip in Research

Since the close of the war, there has been a decided fillip in research activities, this apparently being attributable to the many outstanding technical developments arising out of the war. The atomic bomb publicity also has given research a popular flavor. In addition, government-sponsored research would be extended by two bills now pending in Congress.

Clyde Williams, director, Battelle Memorial Institute, Columbus, O., reports that his organization now has a volume of research activity which is one-third larger than a year ago. Mr. Williams expects that research programs will be conducted more intensively in the future, and Battelle is planning to expand its facilities.

Battelle will bring in men who are doing advanced work in college and train them in research methods. These men will serve "internships," in somewhat the same manner as graduates of medical schools in hospitals.

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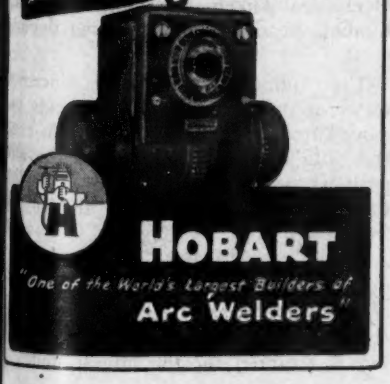

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that of water in the corresponding stage of the quenching period. Warming of the bath, however, decreases the viscosity and imparts mobility to the oil, permitting increased convection and faster heat transfer, and, accordingly, the best quenching speeds are secured with a bath temperature ranging from 90 to 140°F.

Final cooling stage in an oil bath sets in at a considerably higher temperature than in the case of water, and the cooling power here is only about half that of water. As a result of these two facts, the temperature of the hardening transformation is reached. Therefore residual stresses which favor cracking and warping are of lower degree in an oil quench. Occasional cracking of certain tool steel parts which harden completely through may still occur in an oil quench. Here withdrawal of the hot work from the quench and finish cooling in air is more easily accomplished at a given work temperature than in the case of water because of the lower cooling rates involved. However, this expedient is not generally applicable where large difference in work thickness exists.

The metallurgical development of heat treatment in the past 10 to 15 years has been far greater than in any other era. With these new developments it is possible to reproduce uniform results with maximum properties, if they are furnished with uniform material. The metallurgist today believes that in most instances controlled chemistry is not his answer to uniform results. For example:

1. It is possible to have several heats of steel furnished to the same specification, each heat possessing different hardenability.
2. Alloy steels, regardless of composition, have strikingly similar tension qualities when fully hardened.
3. Some of the present chemical specifications have too wide a hardenability band to be practical.
4. It requires a minimum hardenability to obtain desired results and often, if the hardenability is too great, trouble occurs.

Steel users and manufacturers now appreciate these facts and have appointed committees which represent the Iron and Steel Committee of the War Engineering Board, the General Standards Committee of the Society of Automotive Engineers and the Technical Committee of Alloy Steel of the American Iron and Steel Institute. It is their purpose to standardize specifications to serve the mutual interests of the users and manufacturers of steel. The work of the latter committee has been reported and published as "Contributions to the Metallurgy of Steel—No. 11", entitled "Tentative Hardenability Band."

(*Continued next week*)

—o—

Several improvements in cellular glass insulation have been made by Pittsburgh Corning Corp., Pittsburgh. One change increases the number of cells per cubic foot from 5,000,000 to 10,000,000, thus providing additional thermal protection. Foamglas is an inorganic material.

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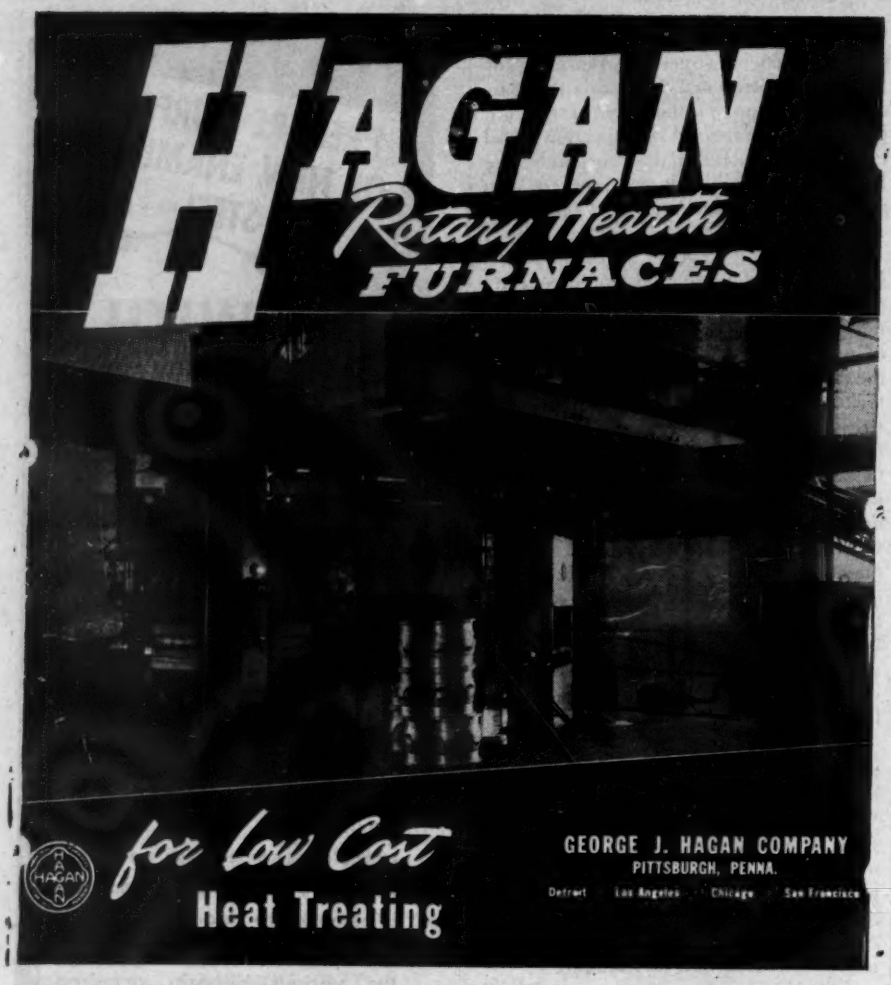

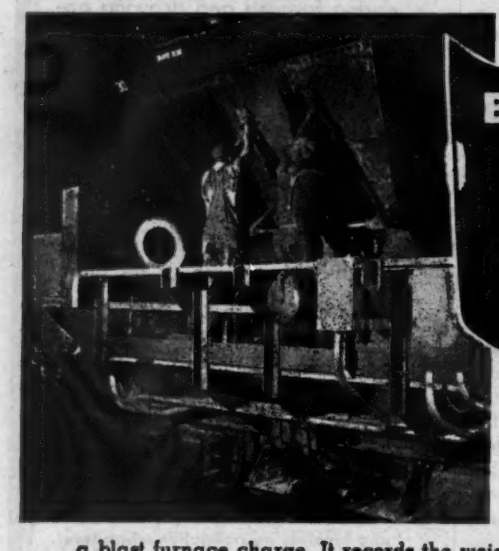

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Tungsten-Free German Cutting Alloy Discovered

The super-cutting alloy discovered in Germany by Gregory Comstock, director of research in powder metallurgy Stevens Institute of Technology, while working in that country as a field expert for the Technical and Industrial Intelligence Committee, is said by him to have been a direct result of impending exhaustion of German tungsten stocks toward close of the war.

The material, a titanium-vanadium carbide identified as V814 and one which had a brief but definitely successful career in tool tips applied to mass production operations, had been under development for 4 or 5 years. German scientists were seeking a tungsten-free hard carbide cutting material that could be used as a substitute for S1, one of the ten high-tungsten carbides on which German industry standardized during the war, according to Professor Comstock.

Composition of V814 is 45 per cent vanadium carbide, 45 per cent titanium carbide, either 7 or 10 per cent nickel and 3 per cent cobalt. In contrast, the composition of S1, for which it was to substitute, was 78 per cent tungsten carbide, 16 per cent titanium carbide and 6 per cent cobalt. Grade S1, like its companion types S2 and S3 on the standardized list, was designed primarily for steel cutting. Although V814 can be made by the cold-press vacuum sintering method, it generally was produced on the metal powder hot press.

Data on physical properties and performance of the super-cutting alloy is expected to be made available upon completion of tests now going on in Great Britain and the United States.

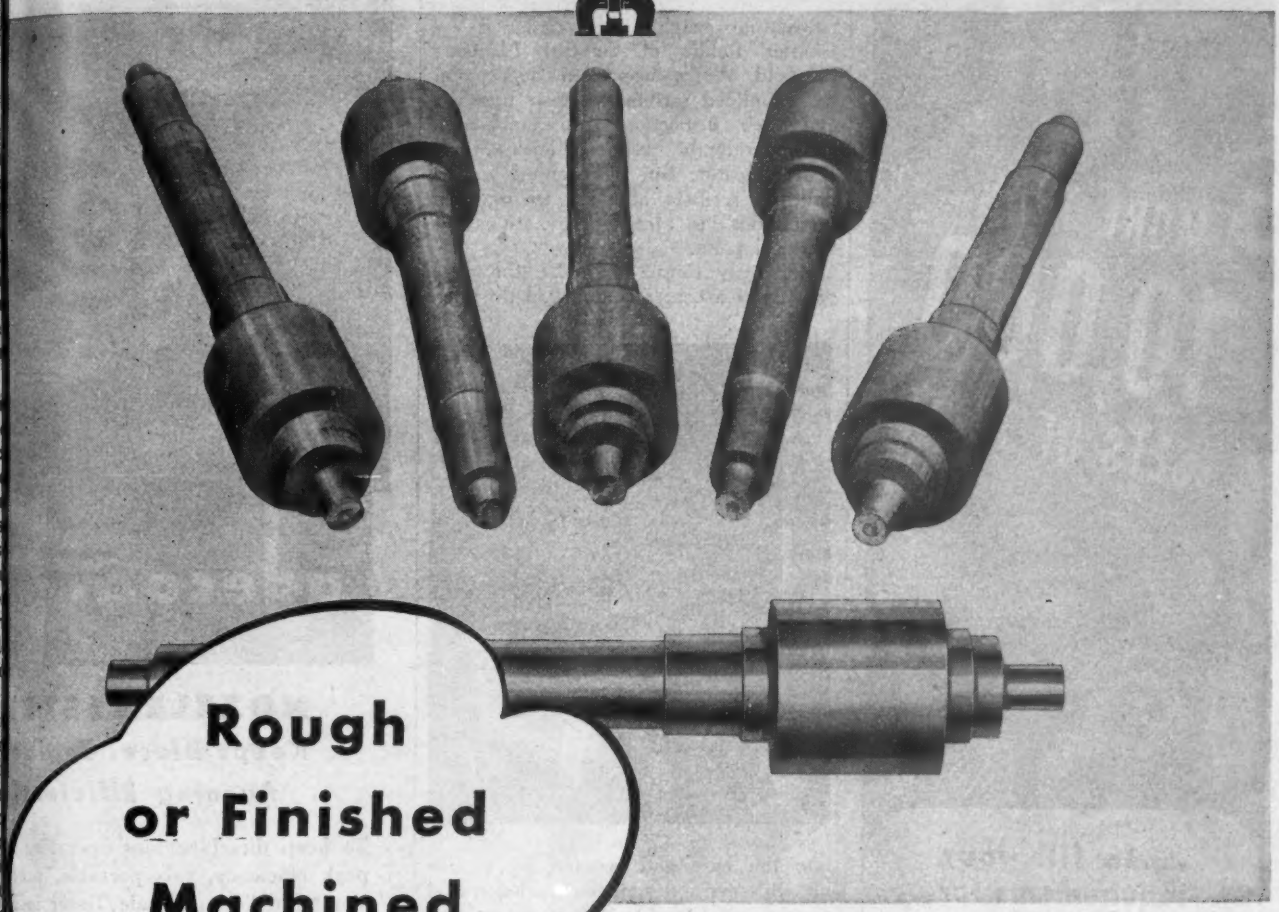
Synthetic Useful in Air-Cleaning Apparatus

A special type of Plioweld, or acid-resistant synthetic rubber, has been developed by Goodyear Tire & Rubber Co., Akron, O., for steel, chemical and powder plant air-cleansing apparatus, according to W. C. Winings, manager, Mechanical Goods Division, and N. E. Kimball, head of the tank-lining department.

The rubber is employed wherever water or moisture, laden with acids removed from the air, might come in contact with the metal with which the air-purifiers are built. Plioweld is sealed to the metal in varying thicknesses from $\frac{1}{8}$ to $\frac{1}{4}$-in.

Smallest of the fourteen sizes of air-purifiers made requires about 450 lb of Plioweld. An average of 1000 lb of the specially compounded synthetic rubber is required for the largest unit.

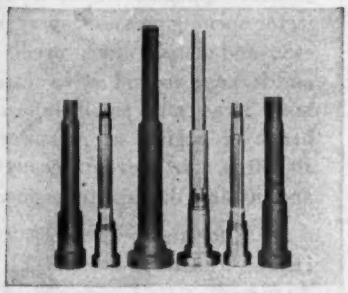
JOHNSTON & JENNINGS HAMMERED FORGINGS



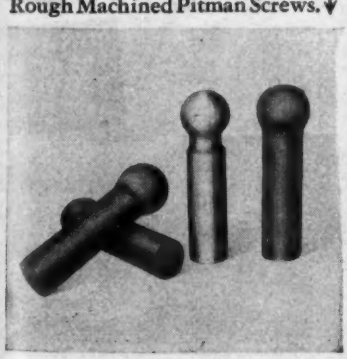
Rough or Finished Machined

● Our extensive machine department, completely equipped with turret lathes, heavy duty lathes, and Lo-Swing lathes; horizontal and vertical boring mills, shapers, planers, milling machines, and various other equipment, puts Johnston & Jennings in ideal position to meet every requirement of the constantly increasing number of buyers who want their forgings delivered rough machined.

In addition, we regularly do much of the finish machining for certain purchasers, depending upon conditions in the customer's plant and his facilities for further processing. The pieces are shipped to the purchaser according to a schedule worked out carefully in advance. Thus, to all practical purposes, we function exactly as though we were an integral department of his own plant. But send for Bulletin No. 421,—It gives full details—and "Check with J & J" on your next forging job.



▲ *Above:*—Smooth Forged and Finish Machined Spindles Illustrating the Advantage of Our Close Limit Forging. *Below:*—Three Smooth Forged and One Rough Machined Pitman Screws. ▼



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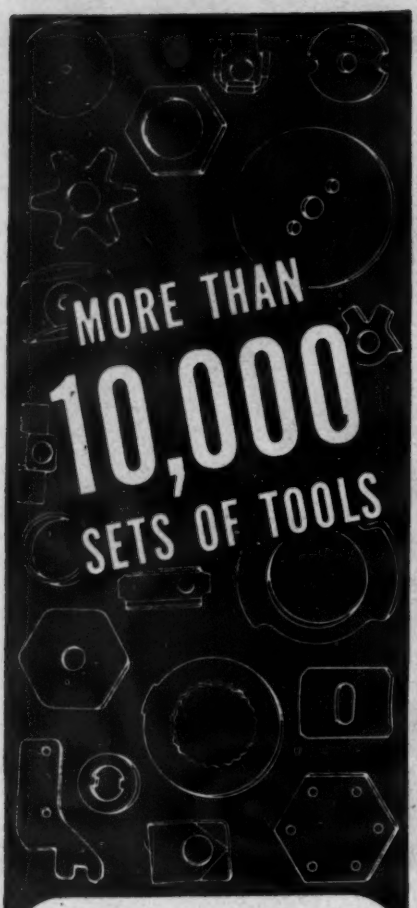

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SPECIAL WASHERS & SMALL STAMPINGS

When you need Special Washers or Small Stampings *send us your blue-prints or specifications.* If one of our 10,000 sets of tools won't give you what you want, we will place our expert Tool & Die Department at your disposal.

We are specialists in designing and producing Special Washers and Small Stampings from steel, brass, copper and other metals. Our quarter century of experience is your assurance of careful attention to every detail.

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Also a full line of Standard Washers—U. S. S., S. A. E., Burrs. Etc.—in kegs or cartons.

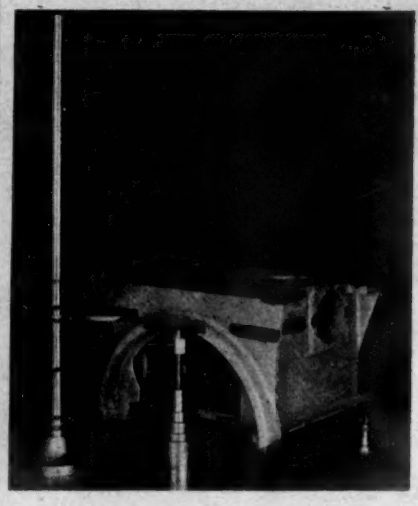
THE MASTER PRODUCTS CO.

6400 PARK AVE. CLEVELAND 5, OHIO

Gage for Inspecting Gear Housings

Multiple height gage designed by Charles Rohlfs of General Electric's Pittsfield Works inspection department has simplified scribing of gear housings and their inspection after machining, and considerably reduced layout time. Dial indicators can be clamped to the multiple scribers and set to required dimensions to inspect quantities of identical parts.

Relatively simple to make, the gage consists of a center column-rod threaded



into the base and secured by a lock nut. Spacers and scribers, hardened and ground, are drilled to slide-fit the column rod. Spacers are ground to dimensions that will place the scribers correctly for the layout of the required lines for machining. After these are placed on the rod and correctly spaced, the assembly is secured by a cap nut. To compensate for the variations in unmachined castings, the complete assembly of spacers and scribers can be adjusted higher or lower, without distributing any of the dimensions between the scribers, by loosening the lock nut and screwing the center column rod in or out of the base, as the case may be.

By using a set of spacers for each drawing, the scribers are easily spaced and secured, and any quantity of identical parts can be rapidly laid out. This new gage eliminates use of the conventional gage, which had to be set for each line and the reading checked before scribing.

Gasoline Powered Welders Converted to Natural Gas

Thirty-five 300 amp gas engine-driven arc welders have been used at Todd Houston Shipbuilding Corp., Texas, in places where electric power was not readily available. It was accordingly necessary to use engine-driven welders until this area in the shipyard could be provided with sufficient electrical power to operate the electric drive welders

adeco...

NOZZLE TESTER

Keeps Diesel Engines Running Efficiently

To keep diesel engines operating at peak efficiency, this portable, precision-built Adeco Nozzle Tester is indispensable.

Light in weight yet built for heavy duty service, it enables any mechanic to make quick accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Tests both large and small injectors, on bench or engine, at pressures up to 10,000 p. s. i. Prevents costly delays and possible damage to engine.

Ideal for testing hydraulic devices.

•

Write for bulletin on this practical, low-cost unit.

TESTS FUEL INJECTORS AND HYDRAULIC DEVICES at Pressures up to 10,000 p.s.i.

ADECO

AIRCRAFT & DIESEL EQUIPMENT CORP.

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Upton ELECTRIC SALT BATH FURNACES

What Depth do You Want?

FT. 15 FT. 25 FT. 50 FT. ?

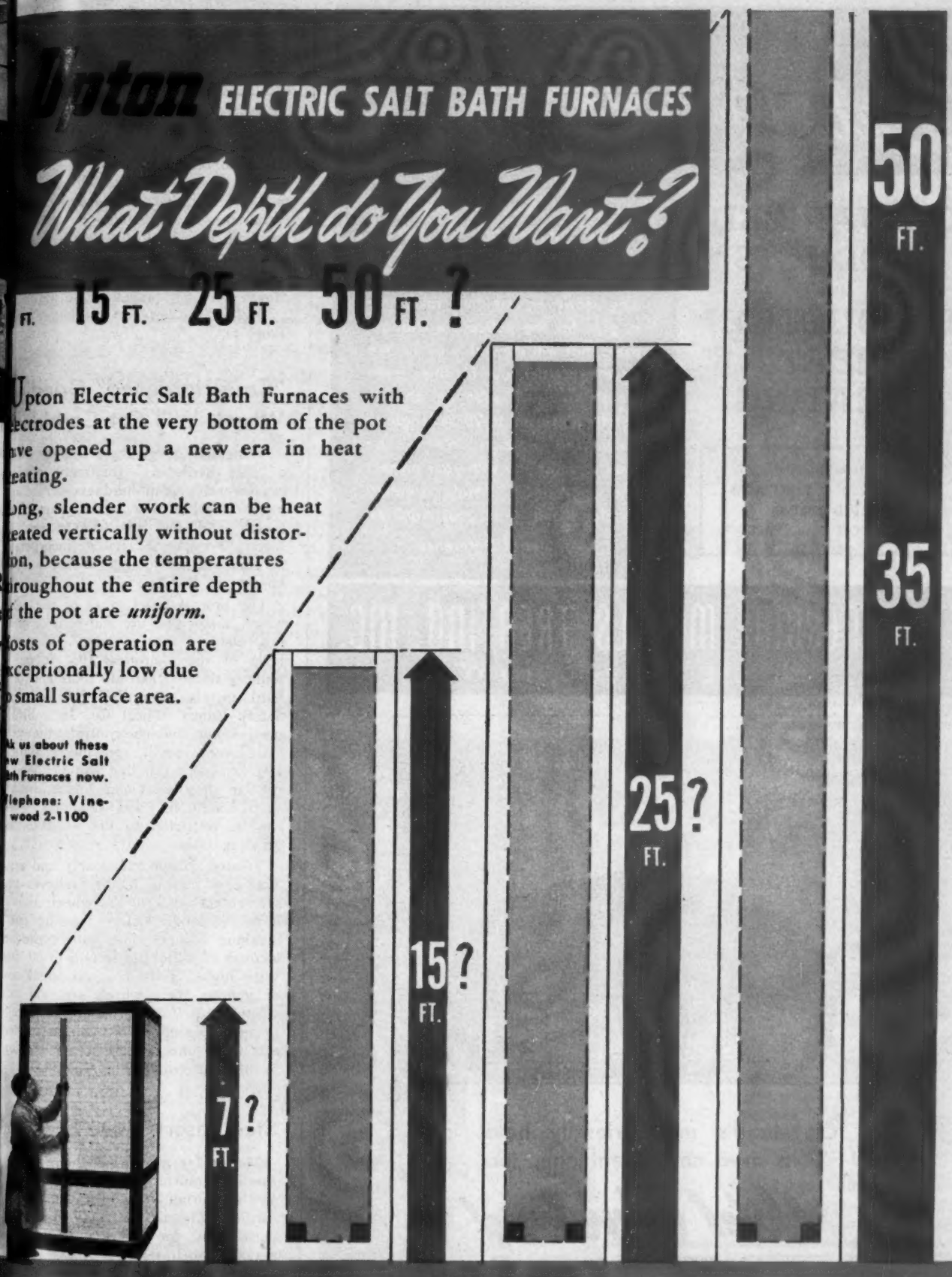
Upton Electric Salt Bath Furnaces with electrodes at the very bottom of the pot have opened up a new era in heat treating.

Long, slender work can be heat treated vertically without distortion, because the temperatures throughout the entire depth of the pot are *uniform.*

Costs of operation are exceptionally low due to small surface area.

Ask us about these new Electric Salt Bath Furnaces now.

Telephone: Vinewood 2-1100



Upton ELECTRIC FURNACE DIV.

7455 MELVILLE AT GREEN ● DETROIT 17, MICHIGAN

Let's talk this thing over...

GALVANIZED PRODUCTS
AND
PRODUCTION HEAT TREATING

Manufacturers of
GALVANIZED & FABRICATED
WELDED TUBING
TENT POLE HARDWARE

We can't sit down to a Peace Conference just yet and Commercial Metals Treating, Inc. is busy maintaining war-time production schedules. However, we must take time to plan for the peacetime change-overs that will inevitably come. We have expanded our facilities enormously and will soon be able to handle pieces up to 20' in length in galvanized products. We will be glad to assist you with your present and post-war metals treating problems and invite your inquiries.

"A Material Difference"

COMMERCIAL METALS TREATING, INC.
TOLEDO OHIO

Cleveland's most friendly hotel is its most convenient one, too.

Hotel Cleveland
CLEVELAND, OHIO

Directly connected with Union Passenger Terminal

and free the gasoline engine-driv welders for portable welding in oth parts of the yard.

Although originally equipped w gasoline carburetors, these engine-drive arc welders ran for several months o natural gas rather than gasoline. Whe ever engine-driven equipment such this is to be set in one place for eve a short period of time, it was foun to be practicable to change over th carburetor from gasoline to a natura gas type and hook the engine directl to a natural gas feed.

The engine-driven arc welders em ployed on this project were produce by Hobart Brothers Co., Hobart Squar Troy, O.

"Case Hardened" Grinding Wheels Will Cut Carbides

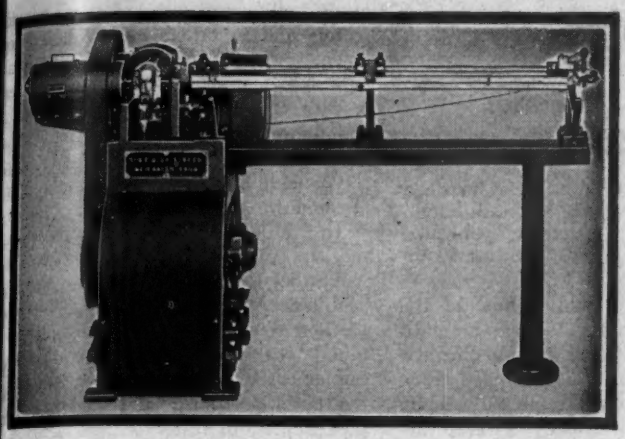
A method of giving grinding whee a "case hardening" treatment compa ing favorably with hardness of the di mond wheel is now, after years of r search and test by Connecticut R search Foundation, being incorporate in standard production of the produc known as BuXite.

The process coats grain of the whe which, under pressure and heat of grind ing, changes into a "case" or surfac layer of such hardness that it rapidl reduces sintered carbide tools and othe hard metals, according to Bridgepo Safety Emery Wheel Co. Inc., Bridg port, Conn., which controls the pro ess. As a result, previously difficu and expensive grinding can be done b regular shop workmen under ordina shop conditions, and diamond whee can be restricted to the most difficu grinding tasks.

Treated wheels cut cleanly and easil This easy cutting quality relieves pres sure on the grain of the wheel, allowin it to cut longer before wearing out breaking out of bond, with consequen increase of wheel life from 5 to 20 time With higher gloss and less break-dow of contour, these wheels are said to b adaptable to form grinding, in additio to giving good results on tool steel cast iron, brass, etc., whether employe in precision grinding or roughing cut.

Steel Inserts Save Fuel

Meters for measuring the amount gasoline transferred from one tank another during flight of a Pan Americ Airlines' Clipper must be disconnecte periodically for testing. Even thoug periodic, such removal made it impo sible to prevent leaks, as the soft met of the ports became worn after a fe operations. Installation of Rosan locke in steel inserts, manufactured by Ban well & McAlister Inc., Hollywood, Cal eliminated this condition, providing hard-metal threaded opening, impervio to ordinary wear, and insert becomes integral part of parent material.



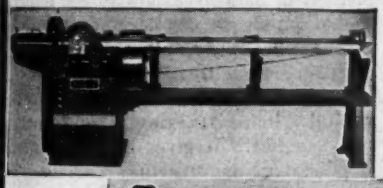
SHUSTER WIRE STRAIGHTENER TYPE A
Wire Capacity 1/32"—1/16" Diameter

Faster Cutting Speeds
GREATER PRODUCTION!

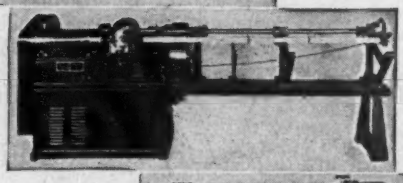
Outstanding Features—

Almost continuous wire travel
Lightning cut-off assures square-cut ends
High speed, direct driven 5-die straightening flier
Quiet, highly efficient V-belt motor drive
Ball and roller bearings throughout
Extremely rigid construction
Fully guaranteed as to material and workmanship.

Descriptive folder on request.

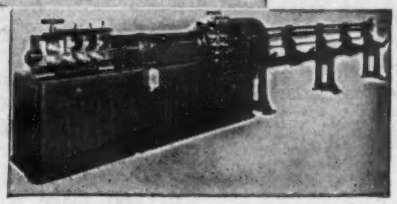


Type 1A
1/16"—3/16"
Dia.



Type 2A
⅛"—¼"
Dia.

Type 3A
3/16"—3/8" Dia.
Type 4A (not shown)
3/8"—5/8" Dia.



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Automatic
WIRE STRAIGHTENING
AND CUTTING
MACHINES
Since 1866

Give Solder STAYING Power

Photo Courtesy of Stanley Tools

USE KESTER FLUXES for Permanence!

Don't risk service difficulties, mechanical failures, with solder flux that won't hold tight! Chemically correct flux—and different fluxes for different types of operations—are imperative for permanent soldering. That's why Kester fluxes are scientifically compounded to form tight, clean solder-bonds resistant to shock, vibration, bending, contraction and expansion. They insure the lasting quality of your product!

For over 45 years Kester Fluxes have been tried, tested and proved dependable. There is a wide range of Kester flux formulas to fit every possible solder operation.

Consult Kester engineers for practical, experienced help in solving any solder problem you may have. They'll gladly suggest the right flux to protect your product—and at no obligation.

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STANDARD FOR INDUSTRY

Deep Drawn Refrigerator Hydrator Trays. Dies of Strenes. 2,000,000 Stampings When War Stopped the Run.

You

WILL BE A STRENES METAL ENTHUSIAST!

If you could cast to shape and lower the machining time on your die castings from ⅓ to ½—the saving in both time and cost would help immeasurably on your post-war tooling.

If you could draw and form several times as many pieces as formerly, even on deep draws, between redressings, that also would help.

Strenes metal dies for drawing and forming press work can give you the above results and should be investigated at once.

Practically all manufacturers of automobiles, trucks, tractors, farm implements, refrigerators, stoves use Strenes metal dies—as do firms in many other fields. So can you—and to your advantage in cost and time.

Names of users on request.

THE ADVANCE FOUNDRY CO.
119 Seminary Avenue
Dayton 3, Ohio

STRENES METAL
DRAWING AND FORMING DIE METAL

Book Notes

Welding Design Series By Kinkead Completed

Practical Design for AC Welding, Vol. III, by Robert E. Kinkead; cloth, 200 pages, 8½ x 11 inches; published by Hobart Bros. Co., Troy, O., for $3.50 three volume set, $10.

In the third and final volume of the Hobart welding design series, in addition to more idea stimulators in the first volumes the author has developed three lines of thought of interest to welding designers and fabricators. Twenty design plates show valuable hints on what not to do in designing for arc welding, showing common design faults, with suggestions for avoiding. In another 20 plates are shown the natural origin of many complex modern design principles. The final 20 pages show typical patents granted in connection with the welding process, suggesting that new methods may be protected by patents. Volumes I and II still are available at $3.50 each or $10 for the three.

Training for Supervisory Positions in Industry

Training for Supervision in Industry, by George H. Fern; cloth, 188 pages, 6 x 8½ inches; published by McGraw-Hill Book Co., New York, for $2.

This is one of the McGraw-Hill industrial organization and management series. The author is director of the Michigan State Board of Control for Vocational Education and is interested in other worker training projects. This work is an understandable treatment for those concerned with problems of training men for supervisory positions in industry, containing much that also will help the supervisor with his own program of upgrading and his training program. It explains the conference method and recommends it for accomplishing training and deals specifically with such supervisory problems as maintaining mental health in industry, handling problems of women workers, promoting safety, training new workers, disciplinary problems and other matters.

Industry Has Secrets To Make the World Over

Secrets of Industry, by Lewis C. Ord; cloth, 255 pages, 5 x 7⅜ inches; published by Emerson Books Inc., 251 West Nineteenth street, New York 11, for $3

The author has made a careful research into industry, labor and management, compared industrial methods in many countries and analyzes requirements and techniques of industrial efficiency. He believes that the wealth and trade of the nation depend on securing maximum industrial efficiency. In many industries the methods used to attain efficiency are closely guard secrets and in others not even realiz

The volume contains valuable pr tical information for all whose conce is with large and economical output commodities and there are implicatio bearing on future standards of living the United States and the whole cou of domestic and foreign trade.

The author concludes that these ma ters are intimately bound up with th welfare of the American people and wi problems of world peace. Careful a tention to the factors involved, com bined with sound decisions, properl implemented, could yield for America degree of prosperity and well being u precedented in history.

Piping Handbook in New Edition Is Enlarged

Piping Handbook, by Sabin Crock fourth edition; cloth, 1376 pages, 4½ x inches; published by McGraw-Hill Boo Co. Inc., New York, for $7.

In this fourth edition of this standar treatise its scope has been increased t include gas, refrigerating, hydrauli power and transmission piping and corr sion. The chapter on water supply pip ing has been considerably augmente and supplementary material of interes to hydraulic engineers has been added t the section on flow of water in pipe including several formulas.

The volume makes available to th engineer, designer and contractor a com pilation of data necessary to the effectiv use of piping in engineering and indu trial applications, everything from wa ter distribution to hydraulic systems f airplanes. It covers scientific fundam mentals, materials, design and installa tion practice. It gives many useful an dependable construction details, co analyses, dimensional standards, mate rial specifications, definitions, charts an formulas.

—o—

Mercury Arc Rectifiers Offer Extended Application

Use of Ignitron mercury arc rec fiers is expected to make practical e tended electrification of railways in pea time. It will be developed to a poi where it can handle tremendous voltag and make possible transmission of di rect current over long distances, ac cording to Dr. Joseph Slepian, associa director of Westinghouse Research Lab oratories, Pittsburgh.

The Ignitron is made up of an evac ated tube containing a mercury pool in which is dipped an igniter, usually bor carbide, and having opposite it the oth main electrode of anode. The mercu tube and its igniter at the bottom the tube make up the cathode of th device. As the cathode only can em electrons, a one-way street for the cu rent is set up which does not pass th reverse cycle of alternating current, re sulting in a pulsating or direct curre

JEFFREY FLASK FILLERS

TO FIT EVERY FOUNDRY

Fill Every Need

WITH THE TOUCH OF A BUTTON

Time for preparing a mold is often reduced one-third to one-half with Jeffrey Flaskfillers.

They eliminate back-breaking shoveling by directing a constant, easily-handled flow of sand into the flask under push-button control.

There are Jeffrey Flaskfillers in styles and sizes to meet every foundry condition. Let a Jeffrey Foundry Engineer make recommendations.

THE JEFFREY MANUFACTURING COMPANY

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THE BUSINESS TREND

Barometers Indicate Confidence in Future

SATISFACTION with the way total reconversion got started and confidence that readjustment of the nation's economy will be orderly and rapid are reflected in a number of business barometers, particularly stock market activity.

Through the latest week, industrial stocks continued their steady, upward trend and closed higher than at any time in the past eight years. Railroad and utilities stocks, while not as active as the industrials, showed marked gains in the latest week.

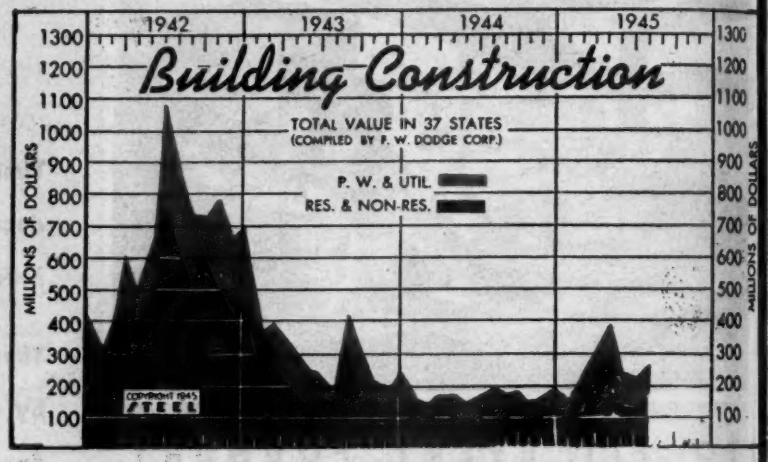
Uncertainties that accompany reconversion have had no dampening effect on financial institutions in their search for places to invest idle money. This situation was illustrated emphatically when a large oil company replaced $64.5 million 2⅞ per cent debenture bonds with a $50 million ten-year bank loan carrying the remarkably low rate of 1.72 per cent.

STEEL PRODUCTION — Reflecting its strength for peacetime operations, the steel industry has been staging a steady comeback in its ingot production rate from a victory holiday low. The Labor Day holiday had a temporary arresting effect on the rise of the weekly ingot rate, but unless some unexpected labor disturbances arise the weekly ingot rate is expected to resume its show of strength.

RETAIL TRADE—Despite country-wide layoffs, retail trade, a good barometer of the ability of the public to buy and of its optimism for the future, enjoyed a moderate increase in the latest week compared with the corresponding week of last year. Some economists have suggested that as some war-scarce commodities return to stores that the pent-up demand for them will be so great that even those people temporarily unemployed will use war savings to make purchases they otherwise would defer until they were re-employed. This consumer demand, those economists say, wou stimulate industry and increase the speed toward a goal full employment.

COAL OUTPUT—Bituminous coal production in t week ended Aug. 25 was at the highest rate since Ju 14, and was nearly equal to that of the correspondin week a year ago. Although production thus far in 194 is 7.6 per cent less than it was for the correspondin period of last year that deficit, which cannot be ove looked, is not as serious as it would have been had wa and its tremendous demands continued.

COKE PRODUCTION—Output of coke in July was 4 per cent greater than it was in June. By-product over increased production while output of beehive plants de clined. Stocks of by-product coke at producers' plan at the end of July had increased 6.2 per cent over June.



Construction Valuation In 37 States
(Unit—$1,000,000)

	Total		Public Works-Utilities			Residential and Non-Residential		
	1943	1944	1943	1944	1943	1945	1944	194
January	140.9	159 2	39.8	50.3	85.8	101.2	108.9	264.
February	147.0	137.2	32.0	55.1	112.9	115.0	82.1	280.
March	328.9	176.4	90.6	61.3	123.0	238.3	115.1	216.
April	395.8	179 3	111.9	72.0	127.7	283.9	107.3	175.
May	242.5	144.2	107.9	55.8	95.8	134.6	88.4	138.
June	227.3	163.9	95.0	70.7	73.3	132.3	93.1	156.
July	257.7	190.5	89.9	80.5	50.0	167.8	110 0	183.
August	....	169.3	....	69.4	73.4	....	99.9	340.
September	....	175.7	....	64.1	175.1	....	111.6	125.
October	....	144.8	....	52.2	63.5	....	92.6	150.
November	....	164.9	....	48.0	59.0	....	116.9	125.
December	....	188.5	....	66.6	67.4	....	121.8	184.
Total	....	1,993.9	....	746.0	1,106.9	....	1,247.7	2,291.

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	75	70	89.5	96.5
Electric Power Distributed (million kilowatt hours)	4,200†	4,116	4,432	4,415
Bituminous Coal Production (daily av.—1000 tons)	2,008	1,157	1,988	2,013
Petroleum Production (daily av.—1000 bbls.)	4,590†	4,892	4,922	4,658
Construction Volume (ENR—Unit $1,000,000)	$35.3	$23.0	$76.4	$60.3
Automobile and Truck Output (Ward's—number units)	13,845	14,880	18,690	20,055

*Dates on request. †Preliminary.

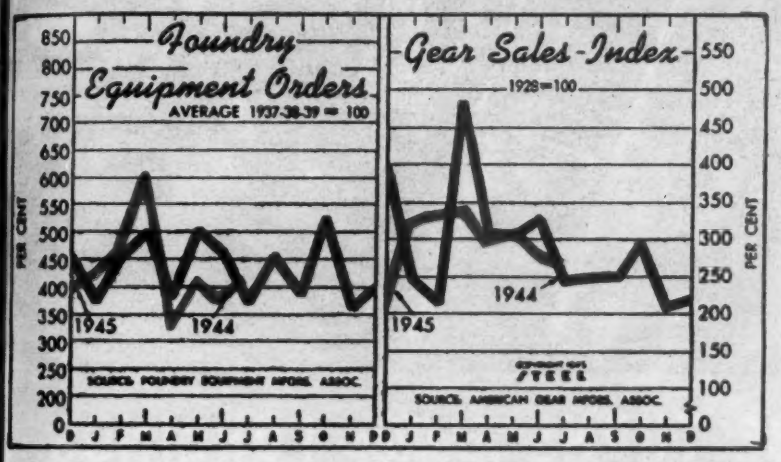
TRADE				
Freight Carloadings (unit—1000 cars)	885†	853	864	898
Business Failures (Dun & Bradstreet, number)	6†	16	18	14
Money in Circulation (in millions of dollars)‡	$27,600	$27,506	$27,130	$23,221
Department Store Sales (change from like week a year ago)‡	+6%	−17%	+15%	+18%

†Preliminary. ‡Federal Reserve Board.

Factory Employment

(000 omitted)

	1945	1944	1943
January	15,333	16,825	16,423
February	15 317	16,735	16,599
March	15,368	16,539	16,747
April	15,102	16 309	16,774
May	14 811	16 122	16 753
June	14,523	16,093	16,908
July	14,100	16 013	17,059
August	.....	16 023	17,182
September	.....	15,843	17,136
October	.....	15,692	17,194
November	.....	15,607	17,238
December	.....	15,632	17,080
Monthly Ave.	.....	16,121	16,924

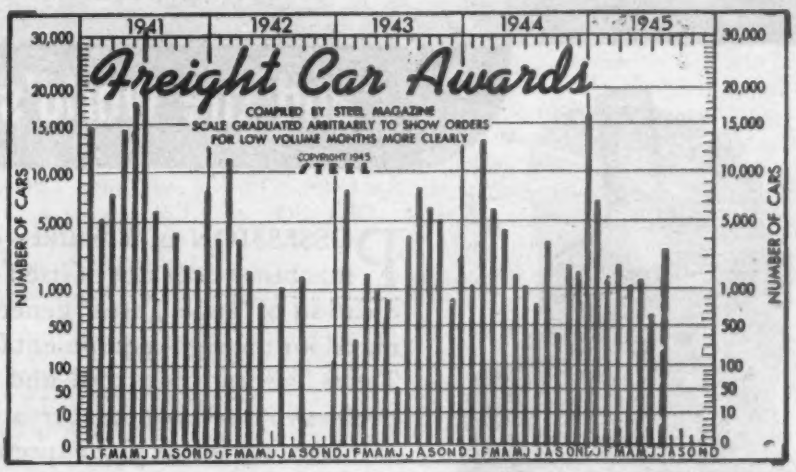


Foundry Equipment Orders and Gear Sales

	Foundry Equipment Orders, Monthly Average (1937-38-39=100)			Gear Sales Index (1928=100)		
	1945	1944	1943	1945	1944	1943
Jan.	422.4	378.3	429.8	323	246	268
Feb.	463.3	456.8	399.5	331	214	303
Mar.	601.7	498.4	562 7	359	485	334
Apr.	325.0	385.7	362.7	296	308	240
May	401.7	503.9	348 9	309	305	342
June	375.4	466.1	413.6	271	328	401
July	411.7	375.8	379.4	264	242	374
Aug.	....	450.5	390.4	...	247	312
Sept.	....	388.0	346.6	...	248	320
Oct.	....	526.5	436.6	...	293	368
Nov.	....	369.5	388 0	...	209	387
Dec.	....	397.4	442.8	...	219	387
Ave.	....	433.1	408.4	...	279	336

Freight Car Awards

	1945	1944	1943	1942
Jan.	7200	1,020	8,365	4,253
Feb.	1,750	13,240	350	11,725
March	2,500	6,510	1,935	4,080
April	1,120	4,519	1,000	2,125
May	1,526	1,952	870	822
June	670	1,150	50	0
July	3,500	705	4 100	1,025
Aug.	....	3,900	8,747	0
Sept.	....	400	6,820	1,863
Oct.	....	2,425	5,258	0
Nov.	....	1 065	870	0
Dec.	....	16,245	2,919	135
Total	....	53,221	41,374	26,028


Freight Car Awards
COMPILED BY STEEL MAGAZINE
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR LOW VOLUME MONTHS MORE CLEARLY
COPYRIGHT 1945 STEEL
NUMBER OF CARS
1941 1942 1943 1944 1945
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$9,943	$9,023	$10,477	$8.639
Federal Gross Debt (billions)	$263.4	$263.2	$262.5	$211.2
Bond Volume, NYSE (millions)	$118.9	$42.9	$19.6	$24.9
Stocks Sales, NYSE (thousands)	5,767	5,756	3,541	3.311
Loans and Investments (billions)†	$62.7	$63.1	$63.9	$53.9
United States Gov't. Obligations Held (millions)†	$46,455	$46,770	$47,312	$41,875

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$58.27	$58.27	$58.27	$56.73
All Commodities†	105.5	105.5	105.8	103.5
Industrial Raw Materials†	116.9	116.9	118.5	112.5
Manufactured Products†	102.1	102.1	101.9	101.0

†Bureau of Labor Statistics Index, 1926 = 100.

TUBE TURNS *Better* FORGINGS

and the world's largest upsetter

POSSESSION of a battery of the world's largest upset forging machines does not of itself prove top quality. Rather, it is an indication of Tube Turns' general attitude toward equipment—a demand for the right equipment for the right job whether it be in Tube Turns laboratories, tool and die shop, in upset and mechanical presses or precision heat treating furnaces.

It is true that this giant upsetter and its mates have achieved results never before known, with steel and light alloys. Top-flight Tube Turns metallurgists developed new technique and abilities to meet wartime emergencies. These new skills and methods are now available to improve peacetime products of American industry. So also are the magnificent facilities of the great Tube Turns plants.

Let these facilities and the experience of these men work for you to consider how forgings can help your products compete in the active markets of the near future. Write, without obligation, Tube Turns (Inc.), Louisville 1, Kentucky.

TUBE TURNS *Forgings for Industry*

teelmakers Face Problems n Adjusting to Peace

Disposal of CMP orders and effect of new priorities not clear . . . Progress made in scheduling production—All markets firm

UBSTANTIAL headway is being made in setting up schedbut steel mills still find problems ahead, apart from those g from cancellations and the difficulty of many conrs in appraising their requirements accurately.

though there will be no further Controlled Material Plan ments after Sept. 30, the question still puzzles many whether validated orders already on books for fourth ter should be given preference over the general run of an requirements. Informed opinion is that WPB imposes ch obligation, with the matter entirely up to the producers selves. Undoubtedly as many of these orders represent contracts they will be filled to the general satisfaction of consumers.

here also is renewed speculation as to the extent of MM CC tonnage that may develop next quarter. Such busiwould take precedence over ordinary civilian work. While expected at best to be too heavy, the opinion nevertheless ils that that MM tonnage may be heavier than originally cted. Also, CC ratings, proposed for expediting essenivilian work, may cover a wider scope than earlier exd. Some trade interests look not only for canners to such ratings but possibly the automobile industry and ads, particularly with regard to rails, and the utilities, g others.

o to be cleared up more definitely are the policies re- to exports, particularly with regard to substantial coments made originally under lend-lease and still, it is unood, to be held on the books. Meanwhile some large llations are still being noted, although in general the me of canceled tonnage is shrinking appreciably and producers are booking tonnage more freely. Sheet and strip orders are fast filling up cancellation gaps in fourth quarter schedules and in some lines, notably galvanized and silicon sheets, most mills are booked solidly well into next year. However, full effect of MM and CC ratings remains to be seen.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

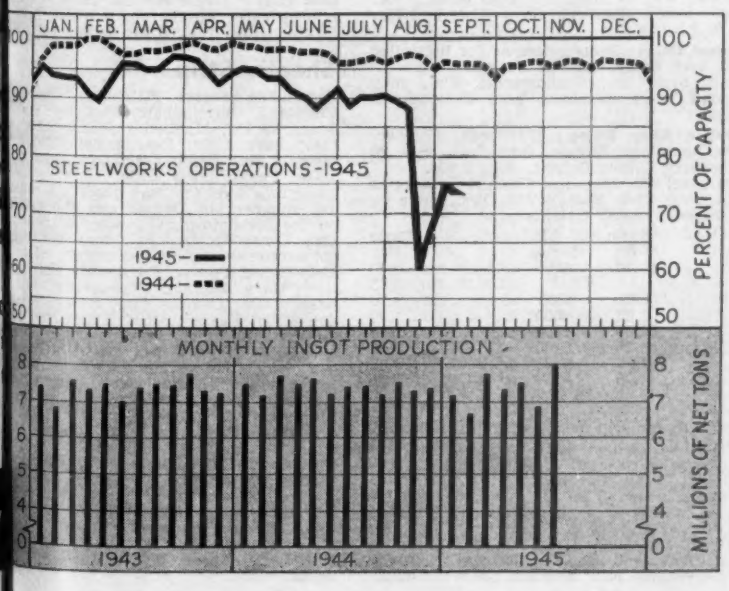
	Week Ended Sept. 8	Change	Same Week 1944	Same Week 1943
Pittsburgh	65.5	+0.5	89	100
Chicago	72	—9	99.5	99
Eastern Pa.	72	None	95	95
Youngstown	72	—4	90	97
Wheeling	95	+4	97	99
Cleveland	78.5	—5	92	94
Buffalo	72	+7	88.5	90.5
Birmingham	95	None	95	100
New England	80	+2	85	95
Cincinnati	82	+2	87	94
St. Louis	65	None	87	90.5
Detroit	89	None	89	90
Average	73.5	—1.5	96	99.5

*Based on steelmaking capacities as of these dates.

Steelworks operations last week showed effects of shutdowns for Labor Day and the national rate is estimated at 73½ per cent of capacity, a drop of 1½ points from the prior week. A number of districts overcame the holiday effect and advanced production slightly. Cincinnati gained 2 points to 82 per cent, Pittsburgh ½-point to 65½, Wheeling 4 points to 95, New England 2 points to 80 and Buffalo 7 points to 72. Chicago dropped 9 points to 72, Youngstown 4 points to 72 and Cleveland 5 points to 78½. Rates were unchanged as follows: Birmingham 95, St. Louis 65, eastern Pennsylvania 72, and Detroit 89.

Strength in scrap continues, with large consumers paying ceiling prices for steelmaking grades and no weakness visible, except perhaps in lack of buying of borings and turnings, which are in far smaller supply than formerly. With a view to enlarged steel production and following usual preparations for a reserve for winter melters are taking all offerings of best grades.

Despite slackened steel production while industry readjusts to peacetime conditions movement of iron ore from Lake Superior mines shows little change. August saw 10,731,804 gross tons loaded at the head of the lakes, only 1,556,449 tons less than moved in August last year. To Sept. 1 the tonnage moved was 51,128,672 tons, compared with 54,574,672 tons to the same date in 1944. Expected heavy steel production during the winter causes consumers to desire to build up reserves to a better level than existed last winter. Qualified observers believe the season total will be close to 80 million tons, compared with 81,170,538 tons in the 1944 season.



COMPOSITE MARKET AVERAGES

	Sept. 8	Sept. 1	Aug. 25	One Month Ago Aug., 1945	Three Months Ago June, 1945	One Year Ago Aug., 1944	Five Years Aug., 1
Finished Steel	$58.27	$58.27	$58.27	$58.27	$58.27	$56.73	$
Semifinished Steel	37.80	37.80	37.80	37.80	36.45	36.00	
Steelmaking Pig Iron	24.05	24.05	24.05	24.05	24.05	23.05	
Steelmaking Scrap	19.17	19.17	19.17	19.07	19.07	19.17	

Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelmaking Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; o

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for last Month, Three Months and One Year Ago

Finished Material	Sept. 8, 1945	Aug., 1945	June, 1945	Sept., 1944
Steel bars, Pittsburgh	2.25c	2.25c	2.25c	2.15c
Steel bars, Philadelphia	2.57	2.57	2.57	2.47
Steel bars, Chicago	2.25	2.25	2.17	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.25	2.25	2.25	2.10
Plates, Philadelphia	2.30	2.30	2.30	2.15
Plates, Chicago	2.25	2.25	2.25	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.70	3.70	3.70	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.70	3.70	3.70	3.50
Bright bess., basic wire, Pittsburgh	2.75	2.75	2.75	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.90	2.90	2.90	2.55

Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$36.00	$36.00	$36.00	$34.00
Slabs, Pittsburgh, Chicago	36.00	36.00	36.00	34.00
Rerolling billets, Pittsburgh	36.00	36.00	36.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.15	2.15	2.15	2.00

Pig Iron	Sept. 8, 1945	Aug., 1945	June, 1945
Bessemer, del. Pittsburgh	$26.19	$26.19	$26.19
Basic, Valley	24.50	24.50	24.50
Basic, eastern del. Philadelphia	26.34	26.34	26.34
No. 2 fdry., del. Pitts., N.&S. Sides	25.69	25.69	25.69
No. 2 foundry, Chicago	25.00	25.00	25.00
Southern No. 2, Birmingham	21.38	21.38	21.38
Southern No. 2 del. Cincinnati	25.30	25.30	25.30
No. 2 fdry., del. Philadelphia	26.84	26.84	26.84
Malleable, Valley	25.00	25.00	25.00
Malleable, Chicago	25.00	25.00	25.00
Lake Sup., charcoal del. Chicago	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.19	25.19	25.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33

Scrap			
Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.45
Heavy melting steel, Chicago	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00

Coke			
Connellsville, furnace, ovens	$7.50	$7.50	$7.50
Connellsville, foundry ovens	8.25	8.25	8.25
Chicago, by-product fdry., del.	13.55	13.67	13.55

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941, Feb. 4, 1942 and Ma 1945. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel pr and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding etc., although only principal lished basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to vidual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill Kaiser Co. Inc., $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop, $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $36; Detroit, del. $38; Duluth (bil) $38; Pac. Ports, (bil) $48. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill; Laclede Steel Co., $34 Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $42. Detroit, del. $44; Duluth, billets, $44; forg. bil. f.o.b. Pac. ports, $54.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54, del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $36. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.ob. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, 5—⅜ in. inclusive, per 100 lbs., $2.15 Do., over ⅜—$\frac{47}{64}$-in., incl., $2.30; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific ports $0.50 (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3 : Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham base 20 tons one size, 2.25c; Duluth, base 2.35c; Mahoning Valley 2.32½c; Detroit, del. 2.35c; Eastern Mich. 2.40c; New York del. 2.59c; Phila. del. 2.57c; Gulf Ports, dock 2.62c; Pac. ports, dock 2.90c. (Calumet Steel Division, Borg-Warner Corp., and Joslyn Mfg. & Suply Co., may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100	(.15-.25 Mo) 0.70
			(.20-.30 Mo) 0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.75c; Detroit 2.80c; Toledo 2.90c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City, New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus on hot-rolled bars from Buffalo to Mans

Cold-Finished Alloy Bars: Pittsburgh, C Gary, Cleveland, Buffalo, base 3.35c; D del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pitts Chicago, Gary, Cleveland, Birmingham, rows Point, Buffalo, Youngstown, base Detroit del. 2.25c; Eastern Mich. and 2.30c; Gulf ports, dock 2.50c; Pacific dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburg cago, Gary, Cleveland, Birmingham, Y town, Buffalo base 2.15c; Detroit, del. Eastern Mich. and Toledo 2.30c; Gulf dock 2.50c.

Iron Bars: Single refined, Pitts. 4.40c; refined 5.40c; Pittsburgh, staybolt, 5.75c; Haute, single ref., 5.00, double ref., 6.2

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Birmingham, Buffalo, Young Sparrows Pt., Middletown, base 2.20c; City, base 2.30c; Detroit del. 2.30c; Mich. 2.35c; Phila. del. 2.37c; New Yo 2.44c; Pacific ports 2.75c.
(Andrews Steel Co. may quote hot-rolled for shipment to Detroit and the Detroi on the Middletown, O., base; Alan Woo Co., Conshohocken, Pa., may quote 2. hot carbon sheets, nearest eastern basing

Cold-Rolled Sheets: Pittsburgh, Chicago, land, Gary, Buffalo, Youngstown, Middl base, 3.05c; Granite City, base 3.15c; del. 3.15c; Eastern Mich. 3.20c; New Yo 3.39c; Phila. del. 3.37c; Pacific ports

Galvanized Sheets, No. 24: Pittsburg cago, Gary, Birmingham, Buffalo, Youn Sparrows Point, Middletown, base 3.70c; ite City, base 3.80c; New York del. Phila. del. 3.87c; Pacific ports 4.25c.
(Andrews Steel Co. may quote gal sheets 3.75c at established basing po

Corrugated Galv. Sheets: Pittsburgh, C Gary, Birmingham, 29 gage, per squar

Culvert Sheets: Pittsburgh, Chicago, Birmingham, 16 gage not corrugated, alloy 3.60c; Granite City 3.70c; Pacif 4.25c; copper iron, 3.90c; pure iron 3.95 coated, hot-dipped, heat-treated, No. 2 burgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.85c; Granite City, base 2.95c; Detroit, del. 2.95c; eastern, Mich. 3.00c; Pacific ports 3.50c; **20-gage;** Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.45c; Detroit del. 3.55c; eastern Mich. 3.60c; Pacific ports 4.10c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.30c	4.05c	3.30c
Armature	3.65c	4.40c	3.75c
Electrical	4.15c	4.90c	4.25c
Motor	5.05c	5.80c	5.15c
Dynamo	5.75c	6.50c	5.85c
Transformer			
72	6.25c	7.00c	.....
65	7.25c	8.00c	.....
58	7.75c	8.50c	.....
52	8.55c	9.30c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $5.00.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. 14.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.25c; New York, del. 2.44c; Phila., del. 2.30c; St. Louis, 2.49c; Boston, del. 2.57-82c; Pacific ports, 2.80c; Gulf ports, 2.60c.

Granite City Steel Co. may quote carbon grades 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. Co.; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Structural Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.50c; Pacific ports, 4.15c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c.

Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.55c f.o.b. St. Louis. Geneva Steel Co., 3.25c, Pac. ports; Kaiser Co. Inc., 3.20c f.o.b. Los Angeles).

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 Duluth).

Bright basic, bessemer wire 2.75c
Spring wire 3.35c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:
Standard and Cement-coated wire nails, base; staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.90; galvanized, $2.55; Pac. ports ..... $3.40 and $3.05
Galvanized fence wire, 100-lb., Pittsburgh, Cleveland 3.20c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.55c
Woven fence, 15½ gage and heavier, per rod column ..... .67c
Annealed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Threaded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
⅛	56	33	¼	24	3½
¼ & ⅜	59	40½	⅜	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	54½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½,3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $45.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates $46 net ton, base, Standard spikes, 3.25c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.; Reg. carbon 14.00c, extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung.	Chr.	Van.	Moly.	Pitts. base per lb
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
6.40	4.15	1.90	5	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F.	19.50	22.50	29.50	18.75	24.50
440A.	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point: Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extra mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅞ and ⅝ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
⅛-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought, Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens	
Connellsville, furnace	*7.50
Connellsville, foundry	8.00- 8.50
New River, foundry	9.00- 9.25
Wise county, foundry	7.75- 8.25
Wise county, furnace	7.25- 7.75
By-Product Foundry	
Kearney, N. J., ovens	13.05
Chicago, outside delivered	13.00
Chicago, delivered	13.75
Terre Haute, delivered	13.50
Milwaukee, ovens	13.75
New England, delivered	14.65
St. Louis, delivered	†13.75
Birmingham, delivered	10.90
Indianapolis, delivered	13.50
Cincinnati, delivered	13.25
Cleveland, delivered	13.20
Buffalo, delivered	13.40
Detroit, delivered	13.75
Philadelphia, delivered	13.28

*Operators of hand-drawn ovens using trucked coal may charge $8.00; effective May 26, 1945
†14.25 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.244[22]	4.715	6.012[32]	6.012[32]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.203[22]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.203[22]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[13]	4.872[26]	4.172[22]	4.772	5.816[32]	5.860[32]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[26]	4.152[22]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.790[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[27]	4.841[26]	4.141[22]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[27]	4.965[26]	4.265[22]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[13]	4.40[10]	3.85[21]	4.669	5.60[32]	5.75[32]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[13]	4.30[10]	3.75[21]	4.35	5.60[32]	5.75[32]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[13]	4.40[24]	3.85[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.30[24]	3.75[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.85[21]	4.45[21]	5.60[32]	5.65[32]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.75[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[13]	4.500[24]	3.900[21]	4.659	5.93[32]	5.93[32]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[13]	5.443[26]	4.543[13]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[13]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[13]	4.475[24]	4.111[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[23]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[13]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[26]	4.20[24]	3.85[21]	4.65	5.75[32]	5.85[32]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[13]	4.337[24]	3.987[21]	4.787	5.987[32]	6.087[32]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[13]	4.568[24]	4.08[21]	4.78	6.08[32]	6.18[32]
St. Paul	3.76[9]	3.81[9]	3.81[9]	5.41[9]	3.51[9]	3.86[9]	3.86[9]	5.257[13]	4.46[24]	4.461[21]	5.102	6.09[32]	6.19[32]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[13]	4.347[24]	4.131[21]	4.931	6.131[32]	6.281[32]
Memphis, Tenn.	4.015[5]	4.065[5]	4.065[5]	5.78[5]	3.965[5]	4.215[5]	4.215[5]	5.265[13]	4.78[24]	4.43[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.908[1]	3.45[1]	3.70[1]	3.70[1]	4.75[13]	4.852[24]	4.64	5.215	.....	.....
New Orleans (city)	4.10[4]	3.96[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[30]	5.079[10]	4.70[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.768[3]	4.313[3]	4.313[3]	5.313[30]	4.10[10]	3.75[21]	.....	.....	.....
Los Angeles	4.40[6]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[4]	6.75[4]	6.00[13]	7.20[6]	5.688[21]	5.613	5.85[32]	5.95[32]
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[13]	7.30[16]	5.433[21]	7.333	8.304[32]	8.404[32]
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[13]	6.60[16]	5.638[16]	.....	.....	.....
Tacoma	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[13]	7.60[16]	5.888[21]	.....	.....	8.00[32]
Seattle	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[13]	7.05[16]	5.888[21]	.....	.....	8.00[32]

*Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 33 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—800 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—300 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [26]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton. 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 43-45% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50

Domestic (seller's nearest rail)

48% 3:1	52.80

less $7 freight allowance

Manganese Ore

Sales prices of Metals Reservev Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cent., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Bars per 100 lb.	Basic open-hearth Billets per GT	Electric furnace Bars per 100 lb.	Electric furnace Billets per GT
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.00	$25.50	$27.00	$26.50
Newark, N. J., del.	27.53	27.03	28.53	28.03
Brooklyn, N. Y., del.	28.50	.....	.....	29.00
Birdsboro, Pa., base	26.00	25.50	27.00	26.50
Birmingham, base	‡21.38	‡20.00	26.00	.....
Baltimore, del.	26.61	.....	.....	.....
Boston, del.	28.12	.....	.....	.....
Chicago, del.	25.22	.....	.....	.....
Cincinnati, del.	25.06	23.68	.....	.....
Cleveland, del.	25.12	24.24	.....	.....
Newark, N. J., del.	27.15	.....	.....	.....
Philadelphia, del.	26.46	25.96	.....	.....
St. Louis, del.	25.12	24.24	.....	.....
Buffalo, base	25.00	24.00	26.00	25.50
Boston, del.	26.50	26.00	27.50	27.00
Rochester, del.	26.53	.....	27.53	27.03
Syracuse, del.	27.08	.....	28.08	27.58
Chicago, base	25.00	24.50	25.50	25.00
Milwaukee, del.	26.10	25.60	26.60	26.10
Muskegon, Mich., del.	28.19	.....	.....	28.19
Cleveland, base	25.00	24.50	25.50	25.00
Akron, Canton, O., del.	26.39	25.89	26.89	26.39
Detroit, base	25.00	24.50	25.50	25.00
Saginaw, Mich., del.	27.31	26.81	27.81	27.31
Duluth, base	25.50	25.00	26.00	25.50
St. Paul, del.	27.63	27.13	28.13	27.63
Erie, Pa., base	25.00	24.50	26.00	25.50
Everett, Mass., base	26.00	25.50	27.00	26.50
Boston, del.	26.50	26.00	27.50	27.00
Granite City, Ill., base	25.00	24.50	25.50	25.00
St. Louis, del.	25.50	25.00	.....	25.50
Hamilton, O., base	25.00	24.50	.....	25.00
Cincinnati, del.	25.44	25.61	.....	26.11
Neville Island, Pa., base	25.00	24.50	25.50	25.00
§Pittsburgh, del. No. & So. sides	25.69	25.19	26.19	25.69
Provo, Utah, base	23.00	22.50	.....	.....
Sharpsville, Pa., base	25.00	24.50	25.50	25.00
Sparrows Point, base	26.00	25.50	.....	.....
Baltimore, del.	26.99	.....	.....	.....
Steelton, Pa., base	.....	25.50	.....	26.50
Swedeland, Pa., base	26.00	25.50	27.00	26.50
Philadelphia, del.	26.84	26.34	.....	27.34
Toledo, O., base	25.00	24.50	25.50	25.00
Youngstown, O., base	25.00	24.50	25.50	25.00
Mansfield, O., del.	26.94	26.44	27.44	26.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. ‡For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base)	$30.50		
6.51-7.00	$31.50	9.01- 9.50	36.50
7.01-7.50	32.50	9.51-10.00	37.50
7.51-8.00	33.50	10.01-10.50	38.50
8.01-8.50	34.50	10.51-11.00	39.50
8.51-9.00	35.50	11.01-11.50	40.50

F.o.b. Jackson county, O., per gross ton. Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Electric Furnace Ferrosilicon: Sil. 14.01 to 14.50%, $45.50; each additional .50% silicon up to and including 18% add $1; low impurities not exceeding 0.05 Phos., 0.40 Sulphur, 1.0% Carbon, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$34.00
Chicago, del.	37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$24.50
Valley base	24.50

Low Phosphorus

Basing points: Birdsboro, Pa., $30.50; Steelton, Pa., and Buffalo, N. Y., 30.50 base; 31.74, del., Philadelphia. Intermediate phos., Central Furnace, Cleveland, $27.50

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for each phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky.	$68.50

First Quality

Pa., Ill., Md., Mo., Ky.	54.40
Alabama, Georgia	54.40
New Jersey	50.35
Ohio	47.70

Second Quality

Pa., Ill., Md., Mo., Ky.	49.35
Alabama, Georgia	40.30
New Jersey	52.00
Ohio	36.15

Malleable Bung Brick

All bases	63.45

Silica Brick

Pennsylvania	54.40
Joliet, E. Chicago	62.45
Birmingham, Ala.	54.40

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	32.90
Wire cut	30.80

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.60
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net tons, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. After Aug. 29 base price any grade $30.) war chemicals.

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton, f.o.b. cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer; Rockdale or Rockwood, Tenn.; where Tennessee Products Co. is seller; Birmingham, Ala., where Sloss-Sheffield Steel & Iron Co. is seller; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh. $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central, 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R.R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome; Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65 for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom. 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium, 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir. 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western, spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max., sil. 1.50% max. and carbon 5% max.), per lb. of alloy. Contract, ton lots, $1.89, less, $2.01, eastern, freight allowed; $1.903 and $2.029 central, $1.935 and $2.055 western, spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10 eastern, freight allowed; $1.9125 $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide approx. 2%, or Red Cake; Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309 Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 58-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.06c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, cariot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets. Contract, cariots, bulk .0605c, packed .063c, tons .0655c, less .068c eastern freight allowed; .063c, .0655c, .0755c and .078c, central; .066, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 to c.l., 35c; central 34.25c and 36c; western, 34.55c and 36.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Spot, cariots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder: spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15% net ton to carload, 8c lb. f.o.b. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75c; ton lots 6.50c. Spot ½ cent higher.

Simanal: (Approx. 20% each Si., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Mixed Borings, Turnings	13.75
Machine Shop Turnings	13.75
Billet, Forge Crops	23.75
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turnings	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	14.50
Short Shovel Turnings	16.50
Mixed Borings, Turnings	14.50
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	13.50-14.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	14.06
No. 2 Heavy Melt. Steel	14.06
No. 1 Bundles	14.06
No. 2 Bundles	14.06
No. 1 Busheling	14.06
Machine Shop Turnings	9.06
Mixed Borings, Tugnings	9.06
Short Shovel Turnings	11.06
Chemical Borings	13.81
Low Phos. Clippings	16.56
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

Boston Differential 99 cents higher, steel-making grades; Providence $1.09 higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp Bundles	20.00
Short Shovel Turnings	17.00
Mach. Shop Turnings	15.00
Mixed Borings, Turnings	15.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	22.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$21.00
No. 1 Heavy Melt Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Cast iron Borings	16.00
Machine Shop Turnings	15.00
Low Phos. Plate	22.50

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	15.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dir. Bundles	18.75
Baled Mach. Shop Turn.	18.75
No. 3 Galv. Bundles	16.75
Machine Turnings	13.75
Mix. Borings, Sht. Turn.	13.75
Short Shovel Turnings	15.75
Cast Iron Borings	14.75
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	15.25
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	12.32
Short Shovel, Turnings	14.32
Cast Iron Borings	13.32
Low Phos. Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	16.50

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	$17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	10.00
Shoveling Turnings	12.50
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25

(Cast grades f.o.b. shipping point)

Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	9.50-10.00
Shoveling Turnings	11.50-12.00
Cast Iron Borings	11.00-11.50
Mixed Borings, Turnings	10.50-11.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings Turnings	4.00
No. 1 Cast	20.00

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(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	6.90
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	25.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	16.00

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224 lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Open market, spot, New York, nominal, $125 per 76-lb. flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.49c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ⅝c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze			
90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	8.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ⅝c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb., 11, 14, etc., 3 to 3.50c lb. All other high-grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb. borings and turnings one cent less than segregated.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

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Sheets, Strip . . .

Sheet & Strip Prices, Page 202

Sheets and strip show little effect from cancellations and mills are well filled to the end of the year. So universally are these steel products used in civilian goods that pressure for delivery is as severe as in war months. Producers in many cases are allocating tonnage to give widest distribution and aid in reconversion to peace products.

Pittsburgh — Abnormally heavy influx of new business and failure of war cancellations to develop in anticipated volume are chief factors in the present uncertain delivery situation in sheets and strip. The 5-day work week further accentuates the extended delivery problem on most items. A number of sellers are setting up plans for distribution of steel to their customers on the basis of actual immediate needs, in an effort to assure the most equitable distribution possible during this early reconversion period when new business far exceeds production. One plan contemplates establishing quotas for each sales office. Pressure for deliveries is expected to be particularly heavy for cold-rolled sheets and strip for the automotive industry and galvanized material for much of the consumer items. Because output was held to a minimum during the war period it will be some time before production of enameling sheets will catch up with orders recently placed by refrigerator, stove and other household appliance manufacturers. Bookings on enameling sheets are extended into next year on basis of current production. Additional flat-rolled steel capacity will be available soon in this district, with the installation of a cold-rolling mill at the West Leechburg, Pa., plant of Allegheny Ludlum Steel Corp. for rolling of stainless and silicon strip.

New York — With demand in excess of supply, sheet deliveries are tightening again. Cancellations after the end of the war were not as heavy as many expected, and now that producers once more are in position to quote, backlogs are increasing.

Some leading producers are allocating quotas for fourth quarter to the various district offices, in each of the principal grades, and in certain instances here at least the quotas are not large enough to meet demand. Further, some of these producers have not, in effect, opened books for first quarter, except in certain specialties, such as silicon sheets, in which there have been relatively few cancellations and in which deliveries have fallen heavily into next year since before the end of the war.

Sellers generally endeavor to favor old customers, and are not being guided too much in setting up schedules by the order in which unrated tonnages have been received over past months. At the same time, there is a disposition in various cases to give preference to civilian manufacturers who have granted tonnage under CMP preference over manufacturers who have been forced out of the picture entirely because of requirements for sheets for war and essential civilian production. Certain sellers are not inclined to give manufacturers who have been favored under CMP any more for fourth quarter than they have been getting in the past, but to at least give them that much.

Chicago — Prospects are that cold-rolled sheets will remain tight for many months, so universally are they used. Demand is far above ability to produce. In some instances, they are available in December, but most producers are booked to year's end. Galvanized are not available until January, but this is an improvement over a month ago. Strip mill sizes, hot-rolled and hot-rolled pickled sheets, can be obtained for October delivery. Hot-rolled pickled strip also is in October, but narrow and wide strip and hot-rolled cannot be promised before December. Drum makers and stamping manufacturers are among consumers of sheets and strip hardest hit by war contract cancellations.

Birmingham — Sheet demand continues heavy in this area and production is at about 75 per cent of capacity, with output held down by lack of labor, which is acute. Agricultural needs for sheets is especially strong. Strip production, mainly cotton ties, has been increased by the new cotton baling season and is moderately heavy, although strip production usually continues through the year on a schedule gaged to fit in between other demands.

Boston — Considerable tonnage of narrow cold strip ordered earlier on unrated basis remains to be definitely scheduled. Although subject to frequent revisions, production programs covering the next few weeks are taking form. New orders are substantial but not overwhelming, with most tentative for November delivery, as in the case of alloys included in the October melt. Reconversion is gaining momentum, notably in household appliances and typewriters. The changeover at International Silver Co. plants, where cancellations reach $19 million, will be great, with heavy pentup demand for tableware accumulated here. As in scores of other plants headed toward reconversion, specifications differ materially from war requirements and new buying in sheets reflects this to greater extent than strip thus far. Large cancellations for army footwear also result in shank steel changes for more civilian shoes. One large fabricator of stainless kitchen utensils in the East will be back in full swing on civilian schedules by midmonth, starting mainly on stainless made available by cancellations. Fabricators of civilian consumer goods are frequently more concerned over reconversion prices for finished products than steel supply and to some extent the future of buying is influenced by this uncertainty.

Cincinnati — Sheet mills in this district have substantial backlogs, after elimination of the tonnage canceled since V-J Day, and are operating on full schedules. Most expected cancellations are in, but readjustments in rolling schedules are still necessary to spread available tonnage under pressure for early deliveries. Mills are noting closely the progress in reconversion by automobile manufacturers as a key to the outlook for early next year.

Cleveland — Consumers are pressing for early delivery of sheet and strip, chiefly carbon grades. However, in many cases tonnage requested is in excess of the amount that can be efficiently handled at consumers' plants. In this way they hope to receive a larger portion of available supplies under the rollers' voluntary allocation system than

they would if they limited their requests to minimum requirements.

Sales offices have processed most of the cancellations, although they still are awaiting official word on some orders which producers know should be off the books.

This uncertainty as to which orders are valid continues to confuse scheduling. Some unpickled sheet and strip is still available for delivery late this month and early October; pickled, early in first quarter and coated material, late in first quarter.

Steel Bars . . .

Bar Prices, Page 202

With paper work involved in removing canceled tonnage and remaking rolling schedules nearly completed barmakers now are able to give more definite promises for delivery. Most producers have little open capacity before the end of the year on small and medium sizes. Larger diameters are easier. Alloy bars may be obtained in some instances for September delivery. Cold-drawn bars are available in November from most producers.

New York — Hit hard by war-end cancellations, bar sellers are now getting their schedules lined up to a point where they again can make fairly definite promises. This is expediting new business, which for the past week or ten days has been expanding appreciably. On small and medium sizes of hot carbon bars some producers are now largely covered for the remainder of the year, with little left for October or even November.

Most sellers are in easy position on large specifications, with hot-top quality bars in general on about the same level as common commercial steel. Just prior to the end of the war hot-top quality bar deliveries were on an average anywhere from two to three months further extended than for the other grade.

Despite cutbacks, cold-drawn carbon bars have rebounded more rapidly than hot carbon, as it appears that little if any of this material can be had before November in any size. Bessemer cold-drawn is generally somewhat easier than open-hearth, but with few exceptions not appreciably so.

Boston — Slightly heavier buying of bars for postwar products is associated with increasing revisions in specifications; in alloys substantially different grades will be required and new orders for early fourth quarter delivery reflect this trend. Ratio of NE steels to higher alloys is contracting, with indications more fabricators will return to former SAE grades used and established hardening practice.

Chicago — Some barmakers are unable to take on new business in carbon grades for the remainder of the year, while others have openings in schedules from November on. A month ago earliest deliveries were December and January, depending upon size, thus cancellation of war contracts has produced notable easing. Another factor which must be considered in appraising the situation is that mills have realigned operating schedules to give more economical operations, this embracing a 40-hour work week. Alloy bars are available for October delivery, but show signs of tightening as a few industries make progress in reconversion and enlarge production of peacetime goods. Forge shops are among metalworking plants hardest hit by the war's end.

Pittsburgh — Delivery schedules on most merchant bar sizes fall into October and November, although some mills can promise late September shipment on large rounds. Open-hearth and electric furnace alloys are available in September. Most cancellations are now in, and are considerably less than for some steel products for much of the bar tonnage on mills' books, except for shells, was going into war supporting lines. Influx of new business again is developing rapidly, notably from the railroad, automotive and agricultural implement industries. Cold-drawers have experienced heavy cancellations, but encouraging volume of new business for civilian account has extended delivery schedules into November. Forge shops are operating well below wartime levels. Substantial volume of export tonnage has been booked and based on current inquiries the demand prospects from this source is promising.

Cleveland — Orders for carbon bars have held up surprisingly well while those for alloy have been cut rather sharply, in some instances up to 50 per cent. Alloy bars and rods are readily available; hot-rolled and billets being offered for prompt delivery and cold-rolled early in first quarter.

While much business in the bar market is pending, and has been for many months, awaiting lifting of governmental restrictions, much of this cannot be

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translated immediately into firm orders. Chief uncertainty now concerns specifications, especially sizes.

Alloy specifications are still uncertain in many cases with the future of NE steels clouded. Bolt and nut interests, for instance, do not yet know definitely what alloys their customers will specify and, therefore, have been cautious in placing mill orders.

Philadelphia — Bar buying is accelerating despite the fact that some large producers still have difficulty making firm delivery promises. Business has improved to such an extent that some producers have little carbon bar tonnage available before late November and December. However, especially in large sizes, hot carbon bars can still be had in some quarters in October. In hot alloy bars a full range of sizes can be had for shipment in five to six weeks. Cold-drawn carbon bar schedules run generally into late November and December.

Steel Plates . . .

Plate Prices, Page 203

Most severely hit by cancellations of war contracts steel plates have made some recovery and mills are booked in general for about two months. Railroad cars, locomotives and heavy construction are supporting demand. Change to the 40-hour week has lengthened delivery time somewhat.

Pittsburgh — Plate output is being maintained at a fair rate in spite of cancellation of tonnage for shipbuilding and other direct war contracts. However, some improvement is noted in new orders for railroad cars, locomotives and in heavy construction lines. Miscellaneous ship repair work is an important factor in bolstering demand and steel warehouse interests are actively in the market. A fair tonnage is involved in barge construction work in this area, and construction is under way on a steel float 150 feet long and 26 feet wide for RFC, at the Hillman Barge & Construction Co.'s yards near Brownsville, Pa. Delivery schedules on plates are filled through September in most instances.

Chicago — Except for light-gage plates rolled on continuous mills, backlogs for the next two months are comfortable. Platemakers have realigned schedules on the basis of a 40-hour week and are apportioning available ingots to finished products in accordance with loads and economical operating rates. On this basis, new business takes November delivery. In some instances, platemakers have difficulty maintaining economical operations on continuous mills.

Birmingham — Plate demand and production continue active and mills are operating close to 80 per cent of capacity, a figure which would be higher except for labor shortage. Demand is heavy for general use in addition to large requirements for shipbuilding.

Cleveland — Plate supply is the easiest of all steel products, drop in government demand having been registered long before the capitulation of Japan. Sheet rolling facilities which had been placed on plate work have been restored to their usual schedules and the trend has even reversed in some instances with some sheet being rolled on plate mills. However, this switch is not expected to gain wide application since most producers wish to retain their hold on the plate market and some plate mills cannot be converted. October and November delivery is readily available in this district.

Philadelphia — Plate mills are offering late October and November delivery, with shipment on 3/16-inch plate most extended. Delivery schedules in general are being partially sustained by reduced operations. Demand is irregular and is supported somewhat by export buying.

Wire . . .

Wire Prices, Page 203

New York — Wire mill schedules include a substantial volume of rated tonnage for the remainder of this month and are being pieced out beyond with former open-end tonnage. Due to limited definite delivery, production departments are not yet able to determine the extent of duplication in orders placed earlier. Such buying was thought to be rather large but recent trends indicate some revision as to volume. Spring wire continues tight but some will be available against new orders for fourth quarter, depending on size and grade. Overall backlogs range from four to six months. Bearing plants are getting back to partial production after shakeouts in orders and backlogs centered heavily in aircraft cutbacks.

Boston — While still subject to revision wire mill production schedules

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for the rest of this month and next are stabilizing, with remaining allotted orders supplemented by civilian volume fed into cancellation gaps. Orders still to be fitted into schedules are sufficient to fill the remainder of fourth quarter and beyond on some products. New orders, now well in excess of cancellations, have not filled all gaps but backlogs include a much wider range of products than formerly. Strong demand holds for tire bead wire and some capacity developed for urgent war needs may be retained without priority for steel. While the automobile industry is getting deliveries on other wire, including valve spring, some users are pressing for more. Rope stranding operations are down sharply, but drawing capacity within that range of sizes is active for other requirements and additional galvanizing equipment is also released. Although high-carbon rods are still tight, more fine wire specialties will eventually be worked into fourth quarter schedules than was predicted earlier.

Chicago — Wiremakers report inquiries for merchant products for postwar fabrication a virtual flood, premised apparently on the belief that early delivery can be made. These products move so rapidly that jobbers have no opportunity to build inventories. Demand is particularly heavy for corn cribs and cribbing materials. For manufacturers' wire, substantial increase in demand is observed, particularly for high-carbon spring wire. It is judged that canceling of war orders is near an end. A let-up in new business from the electrical and construction fields is attributed to reconversion. Exceptions are galvanized strand and transmission line conductors. Inventories of wire rope are normal, but are spotty for electrical wire.

Birmingham — Wire production is increasing gradually in this district. Demand for nails and wire fencing is exceptionally active and production has been increased to about 85 per cent of capacity.

Structural Shapes . . .

Structural Shape Prices, Page 203

Chicago — End of the war has made little difference in the structural shape situation, due to the fact that WPB had given the green light to essential industrial plant construction before the war ended. As a result, shape mills and fabricators are well booked for the remainder of the year. Only in a few instances are mill shapes available before January. On lighter sections, which go into machinery and farm implements, business also is heavy. Both phases of this activity are expected to expand sharply in the next few months.

Pittsburgh — Production of structural steel probably will increase through the remainder of this year, reflecting the indicated upturn in construction activity resulting from lifting of WPB building regulations. A number of new inquiries already have appeared for bridges and miscellaneous plant expansion projects. Considerable export tonnage also is in the offing. To meet this renewed demand structural mills are expected to obtain a larger proportionate share of raw steel available than was the case in the closing months of the war. A few sellers are now promising December shipment, although most have openings for late October and November. Need for structural engineers is acute, and must be remedied soon to meet the anticipated steadily rising volume of construction work.

Philadelphia — Although wide-flange tonnage is available for October, standard shapes are generally quoted for November. Large new building projects are still scattered but there is considerable small construction work, which is contributing substantially to expansion of shape mill backlogs. Bids will be opened early in October by commissioners of the District of Columbia on the substructure of a 3000-foot bridge over Anacostia river. While total shape requirements for the bridge will be 4200 tons, the substructure will require only 50 tons. Steel for the superstructure will not become active for seven to eight months, it is understood, as the bridge will cost about $4,500,000 and only $2,200,000 for the substructure has been appropriated so far.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 203

Chicago — Industrial building construction during the balance of the year at a level higher than had been anticipated is expected to create strong demand for reinforcing steel. Requirements currently are not heavy according to peacetime standards but small jobs

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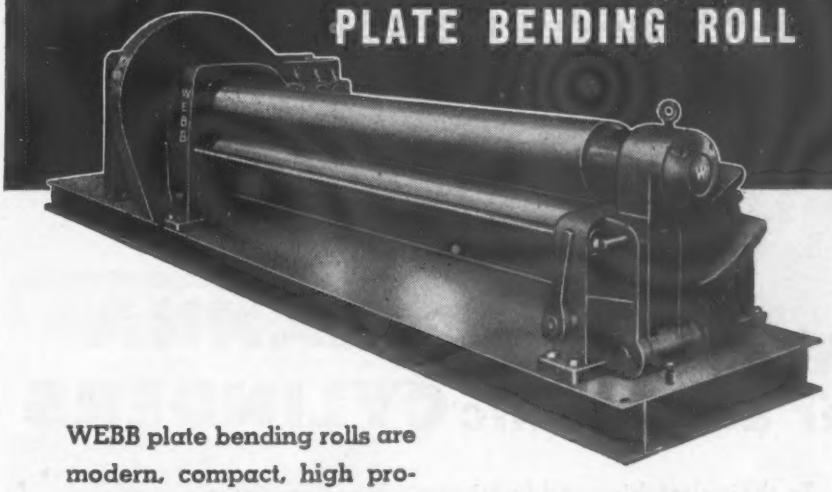

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involving less than a hundred tons each are numerous. Reinforcing suppliers are handicapped by manpower shortage in their engineering and estimating departments, and with steel supply still tight, jobs are not sought after as intensely as in normal times.

Pittsburgh — Reinforcing bar output is not likely to show substantial increase this month, but in October production is scheduled to return to the prewar relationship with merchant bars, which should result in output of nearly three times the current rate. However, despite the indicated sharp increase, backlogs are expected to remain extended into next year in most instances. This will make it necessary to parcel out available production to satisfy essential needs of as many customers as possible. New inquiries are somewhat heavier the past ten days, involving lots from 100 to 200 tons for small plant expansions. Most larger postwar construction is still in the drafting stage.

Pig Iron . . .

Pig Iron Prices, Page 205

Pig iron demand suffers no diminution, except in need for basic by some nonintegrated steelmakers. Foundries seek as much iron as they can get, as inventories are too low for safety with winter approaching. Better labor supply for the latter is expected to increase need for additional iron.

Pittsburgh — A substantial increase in demand for all grades of pig iron for foundry operations is likely for many months, reflecting unusually heavy needs of railroads, farm implements and automotive equipment. Probable gradual easing in the still relatively tight labor situation in foundries should make possible near capacity operations among most foundries before the close of this year, in contrast to 60-70 per cent pace averaged by many throughout the war period. Sharp reduction in steelmaking operations since announcement of Japan's surrender and retrenchment in purchases by some smaller steel producers who had been buying steadily in the open market during the war to supplement their own iron production, have combined to force a marked reduction in overall pig iron consumption. Some interests do not expect postwar demand for basic pig iron to reach wartime levels. However, indicated large increase in foundry pig iron demand will probably offset reduced basic requirements. Sellers state the WPB 30-day inventory limitation held down September specifications from foundries. Many interests are hopeful that this regulation will be lifted soon, for it has prevented maximum efficient operations. Blast furnace interests welcome the current breathing spell, for equipment is badly in need of repairs. In this district 13 out of 54 blast furnaces are banked or blown out. Most of these units have been banked until steel mill schedules are clarified.

New York — A slightly heavier melt than last month is indicated by current pig iron specifications. Gray iron and malleable foundries in particular have heavy backlogs, with war cancellations more than offset by civilian requirements. Apparently the only important restriction is manpower and this is easing a trifle. Possibly by the middle of fall the labor situation will show material improvement. Consumers are covering principally on a month-to-month basis, and this tendency will probably continue, at least as long as the 30-day inventory regulation remains in effect. With basic demand off, the pig iron situation in general in the East is fairly comfortable.

Boston — Pig iron demand for fourth quarter is expected to be stronger with melt up slightly, depending on labor supply. Should remaining controls be lifted substantial increase in buying against winter needs is likely. Thirty-day inventory is not a safe margin with larger foundry and basic consumers depending on outside shipments, largely from Buffalo. With the district furnace down and stocks depleted emergency demand cannot be met by the Everett unit as was the case last winter. The Everett cast pipe foundry, down last year, has not bettered 35 per cent of capacity since resumption, but this is due to manpower shortages rather than lack of iron, which is now brought in instead of being supplied nearby.

Birmingham — Pig iron demand shows a definite upward trend, which is being met by increased production, 18 blast furnaces now being in action after an interruption in recent weeks.

Buffalo—Marked decreases have been noted in pig iron shipments to foundries in Michigan which are strike-bound. However, there has been no accumulation at furnaces. Production and melt are

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retarded by lack of labor. Sellers have opened books for fourth quarter.

Cincinnati — September requisitions for foundry iron match recent levels. Melters are busy and have a backlog, but continue to complain that a shortage of manpower prevents expansion. Some shipments of southern iron are tardy because of recent conditions at furnaces, but in no case has a district melter faced a shutdown for lack of iron. Supplies of by-product foundry coke are easy.

Philadelphia — Demand for foundry iron is strong, although supply is adequate, as the situation has been generally eased by the drop in demand for basic. However, foundry requirements should expand as labor supply increases. Some foundries which had been virtually forced to suspend during the war are getting back into operation and in general iron foundries see much work ahead. Soil pipe producers have particularly heavy backlogs. Steel foundries are being adversely affected by the end of the war.

Chicago — Indicative of the strong demand for pig iron, WPB allocations are being continued through September. Hope is, however, that it may be possible to return to a free market in fourth quarter. In this area, the situation is tight. Requirements for iron are heavy, and supply is curtailed as several blast furnaces remain out of production.

Scrap . . .

Scrap Prices, Page 206

Ceiling prices continue in steel and iron scrap and the situation is firm, melters having an eye to winter needs, in the face of reduced supply. Conditions are quiet generally with highest grades most in demand. Difficulty in processing unprepared scrap in yards continues as the labor situation has not been relieved. Strength is expected to continue through the year, at least.

New York — Following recent consumer buying at ceiling levels, the brokers' market here on melting steel is firm, and having come through this test, the first since the end of the war, it appears likely that this firmness will continue for a while. There is still a shortage of labor at yards, which may be fairly acute for at least another few weeks and the tendency in steel production is upward. Meanwhile, all cast grades are strong, no weakness having appeared at any time, even immediately following Japan's surrender, and most trade interests see no material easing for some time, as demolition work is getting under way slowly.

Cleveland — Scrap prices are strong, although borings and turnings are in light demand and small supply, but the few sales recently made are at ceilings. Consumers are seeking good grades of railroad scrap, which are moving as fast as they appear. Electric furnace specialties are also in demand. Active demand exists for shell scrap made available by contract termination. September is regarded as a transition month and indications are ceilings will be maintained through the year. Melters are seeking to build reserves for winter but prepared scrap is in small supply as yards lack labor to process their collections.

Cincinnati — Although brokers and dealers deny there is any considerable softness to the iron and steel scrap market, all interests are proceeding with caution. Several questions await clarification. For example, what effect will the tonnage from contract terminations have Also, can dealers expect an early increase in the amount of production scrap which has fallen off abruptly? A few cancellations and holdups are current. The approach of winter is proving a strengthening influence. Definite trends are expected soon to end the period of watchful waiting.

Buffalo — Recent buying has increased outstanding orders at ceilings to more than 100,000 tons in this area. Dealers feel the market will remain strong for some time. Turnings are in the balance, melters refusing to pay ceilings and dealers will not sell at less.

Pittsburgh — Scrap prices remain firm here despite relatively little new buying. Re-entry of Bethlehem Steel Corp. into the eastern market, paying ceiling prices plus springboard and commission, has strengthened the belief that except for such grades as alloy turnings no sharp reduction in scrap prices is probable. Some weakness has developed in unprepared material, however, with as much as $3 a ton noted. With new buying at a practical standstill, dealers do not want to stock up with material at former price levels. Alloy free scrap, cast iron and heavy melting steel are scarce. About 2000 tons of heavy melting steel on the Baltimore & Ohio list

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were recently allocated by WPB. This same policy was followed on the 8000 tons on Pennsylvania railroad's list a short time ago, indicating this type distribution is still being sought by consumers. However, sharp reduction in steel ingot operations since the end of the war has resulted in a moderate increase in mill scrap inventories.

Philadelphia — Scrap continues firm although there is much less consumer buying than a fortnight ago and brokers are beginning to clean up on many of their orders. One factor in present firmness is continued shortage of help in scrap yards. However, the situation should ease over the next few weeks and as a result consumers are moving cautiously on long-term commitments, especially as it is recognized that much ship scrap will be released some day. Some export demand is noted, with Sweden inquiring for cast scrap, which in view of present shortage here is like demanding the moon. With Spain seeking round tonnages of steel scrap there is little likelihood of much scrap of any description moving to Europe at this time.

Chicago — A purchase of scrap by a large consumer a week ago, and incidentally the first sizable one since the end of the war, was limited to No. 1 and No. 2 heavy melting and No. 1 bundles, and consequently failed to provide a real test of the market. Ceiling prices were paid on the order, which was understood to involve about 25,000 tons. Mills are taking in material specified in old contracts, but inventories are shrinking and further mill buying within the next two weeks appears to be a certainty.

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Warehouse . . .

Warehouse Prices, Page 204

Pittsburgh — Mill shipments to steel distributors have recorded substantial improvement recently, notably in sheets, strip, pipe and cold-finished bars, although these items still are in relatively tight supply. Distributors also have improved their inventory position through the purchase, in some instances at only $5 a ton above scrap prices, of substantial tonnages of excess steel items forced on the market due to wholesale cancellations of war contracts. Warehouse inventories shortly should be more adequately balanced than in many months. Some distributors have pushed back delivery schedules on a few items due to the sharp reduction in demand, estimated to average about 30 per cent for all products, since the end of the war. However, many small lot orders for reconversion purposes should bolster warehouse steel shipments during the early reconversion period. The number of incoming orders currently matches the near record pace registered during July, but individual tonnages involved are considerably smaller

Cincinnati — Warehouse sales are being well sustained, demand for structurals and plates being particularly brisk. Some recent decrease in calls for bars has been noted. Mill shipments are improving although a lack of balance in jobbers' stocks continues.

New York — Moderate rebound in buying for urgent fill-in requirements for reconversion is experienced by most warehouses. Orders are mainly for light flat-rolled products, with some slight recovery in alloys. Scattered renewals for aircraft quality steels have followed general cancellations by that industry, although the ratio of renewed volume is slight. Mill replacements have not improved materially in most wanted products. In revising mill order programs, distributors are maintaining most of their commitments but are spacing out deliveries in more instances.

Philadelphia — Warehouses in August experienced the slowest month so far this year, but considering the fact the war ended about the middle of that month the decline was relatively light, probably not being more than 10 per cent on an average. Distributors anticipate little change this month but look for an increase as fall gets under way. Galvanized sheets and light structurals are in pressing demand.

Price Is Reduced on Electromelt Manganese

Electro Metallurgical Sales Corp., unit of Union Carbide & Carbon Corp., New York, announces a reduction of 4 cents per pound, effective Sept. 1, on the maximum 2 per cent iron grade of Electromelt manganese metal. The maximum 2.5 per cent iron grade will be discontinued and all shipments of this brand of manganese metal will now conform to the following specification: Manganese 96 per cent minimum; silicon 1 per cent

maximum; carbon 0.2 per cent maximum and iron 2 per cent maximum. All users of this product now will receive the same or a higher quality material at a lower price.

Iron Ore . . .

Iron Ore Prices, Page 204

Lake Superior iron ore shipments in August fell little below those of the comparable period last year, according to the Lake Superior Iron Ore Association, Cleveland. This indicates only a moderate slackening in demand, less than had been expected to follow end of hostilities. Probable heavy demand for steel when reconversion is completed and desire to rebuild inventories higher than they were last spring is causing a continued movement, with expectation that the season's total will be close to 80 million tons.

In the accompanying tabulation the ore credited to Port Arthur docks is from the Steep Rock mine, which also loaded 59,484 tons in August through American docks at Superior, as the Port Arthur dock is not sufficiently completed to handle all the mine's output.

Detailed statistics of August shipments are as follows, in gross tons:

	Aug., 1945	Aug., 1944
Escanaba	604,508	776,934
Marquette	478,067	609,084
Ashland	544,500	742,558
Superior	3,700,849	4,202,218
Duluth	2,958,848	3,118,338
Two Harbors	2,345,004	2,776,925
Totals U. S. Ports	10,631,776	12,226,057
Michipicoten	65,718	62,196
Port Arthur	34,310	.....
Total Canada	100,028	62,196
Grand total	10,731,804	12,288,253

Decrease from August, 1944, 1,556,449 tons.

For the season to Sept. 1 detailed shipments by ports are as follows, in gross tons:

	To Sept. 1, 1945	To Sept. 1, 1944
Escanaba	3,175,083	3,663,507
Marquette	2,446,297	2,596,985
Ashland	2,936,317	3,799,031
Superior	16,494,817	17,897,858
Duluth	13,607,253	13,727,657
Two Harbors	12,120,045	12,587,066
Total U. S. Ports	50,779,812	54,272,104
Michipicoten	300,572	302,051
Port Arthur	48,288	.....
Total Canada	348,860	302,051
Grand total	51,128,672	54,574,155

Decrease from 1944, 3,445,483 tons

Canada . . .

Iron and steel production in Canada during July showed a decline from the previous month and also sharp retraction from the corresponding period of last year. War contract cancellations, labor shortage and plant repairs are said to be responsible for the slowdown. The decline in pig iron output in July also was reflected in bringing production for the seven months of this year below the total for the like period of 1944. Production of steel ingots, castings and ferroalloys, however, continues somewhat ahead of last year's record. In July one blast furnace was banked, leaving eight in blast, one banked and five blown out at the end of the month. Following are comparative production figures in net tons:

	Steel ingots, castings	Pig iron	Ferro-alloys
July, 1945	229,161	150,387	15,750
June, 1945	257,115	159,046	18,473
July, 1944	234,418	166,004	14,508
7 Mos. 1945	1,824,779	1,092,350	114,422
7 Mos. 1944	1,747,001	1,115,527	105,750
7 Mos. 1943	1,749,661	1,019,158	133,201

Steel in Europe . . .

London — (*By Radio*) — Position of the steel plate industry is improving in Great Britain. Rail producers are fully booked for some time. Semifinished steel supply is tight, pending arrivals from overseas. Larger output of pig iron is needed for the light castings trade.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2200 tons, foundry building, Dubuque, Iowa, for Deere & Co., to Gage Structural Steel Co., Chicago; bids June 20.

2000 tons, passenger car shop expansion, Chicago, for Pullman-Standard Car Mfg. Co., to Hansell-Elcock Co., Chicago; Sumner S. Sollitt & Co., Chicago, contractor; bids Aug. 30.

500 tons, addition for Container Co., Reading, Pa., to Belmont Iron Works, Eddystone, Pa., through L. H. Focht & Son, Reading, Pa.,

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400 tons, warehouse and machine room, St. Mary's Kraft Corp., St. Marys, Ga., to Virginia Bridge Co., Roanoke, Va.

320 tons, factory building, Milwaukee, for Chain Belt Co., to Milwaukee Bridge Co., Milwaukee; Klug & Smith Co., Milwaukee, contractor.

250 tons, TPG span, bridge Z-1510, Yorkshire, Iowa, for Chicago, Milwaukee, St. Paul & Pacific railroad, to American Bridge Co., Pittsburgh; bids June 25.

200 tons, mill buildings, De Ridder, La., for Crosby Naval Stores Inc., to Virginia Bridge Co., Roanoke, Va.

STRUCTURAL STEEL PENDING

3000 tons, administration and laboratory building for Navy, at White Oaks, Md.; bids Sept. 14.

2840 tons, axle building No. 5, Pontiac, Mich., for Pontiac Motor Division, General Motors Corp.; bids Aug. 28.

1000 tons, mill building for Lees Cochran Corp., Glasgo, Va.

500 tons, building at Cranford, N. J., for Johnson & Johnson, New Brunswick, N. J.

450 tons, highway bridge, San Angelo, Tex., for state highway commission.

REINFORCING BARS . . .

REINFORCING BARS PLACED

200 tons, Bernstein apartment building, Cleveland, to Truscon Steel Co., Youngstown.

REINFORCING BARS PENDING

2000 tons, square twisted concrete reinforcing bars, Delaware aqueduct, contract 390, Merriman dam, Lackawack, N. Y.

300 tons, Prudential Insurance Co. of America, Watertown, Mass.

200 tons, Western Auto Co., Baltimore.

150 tons, Sears-Roebuck store, Mansfield, O.

100 tons, boardwalk, Atlantic City, N. J.

PIPE . . .

CAST IRON PIPE PENDING

1200 tons, Everett, Wash., 6 and 8-inch, bids rejected; new bids scheduled soon.

100 tons or more, Hillcrest project, Seattle, 6 and 8-inch, bids scheduled soon.

Unstated, $400,000 water system improvement, Kelso, Wash.; survey authorized.

RAILS, CARS . . .

RAILROAD CARS PLACED

Chesapeake & Ohio, 2190 fifty and seventy-ton hoppers; 1490 fifty-ton to Huntington, W. Va., shop of American Car & Foundry Co., New York; 500 fifty-ton hopper coal cars and 200 seventy-ton hoppers to General American Transportation Corp., East Chicago, Ind.; also ten experimental light-weight 50-ton hopper coal cars to Huntington plant of American Car & Foundry Co.

LOCOMOTIVES PLACED

National Railways of Mexico, 32 4-8-4 steam locomotives, 16 to Baldwin Locomotive Works, Philadelphia, and 16 to American Locomotive Co., New York.

Aircraft bolts being tested on a Riehle P2 Precision Universal Hydraulic testing machine. Below—One of National Lock Co.'s nickel steel aircraft bolts.

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Price Ceilings Set for Contractor Inventory Sales

Suppliers of war goods to the government whose contracts have been terminated, and who elect to retain the contractor inventory, can determine their price ceilings for sales of these inventories as follows: Where price ceilings already are established for the same materials when sold in regular commercial channels, these ceilings will apply to the retained inventory of war goods; where there are no existing ceiling prices, sellers will follow simple formulas to arrive at their ceiling prices.

Refractory Product Prices Advanced in Southwest

Manufacturers of refractory products in southern California may increase their present maximum prices by 8.6 per cent, Office of Price Administration announced last week. Jobbers and dealers purchasing these products may add to their established maximum prices an amount not to exceed their dollars-and-cents increased costs resulting from the adjustment granted to manufacturers.

OPA Sets Export Premiums For Relaying Rail

Resellers of relaying rail and used track accessories for export have been authorized by the Office of Price Administration to add the same export premiums to domestic base ceiling prices as are permitted on export sales of new iron and steel products. These premiums range from 6 to 12½ per cent, depending upon the quantity sold; provision is made for extra allowance, de-

pending upon the terms of sale.

Persons warehousing relaying rails and used track accessories must maintain adequate facilities for stocking, reconditioning, shipping and receiving the material if they charge warehouse prices, which are higher than those railroad sellers may charge. The definition of relaying rail in the price regulation, No. 46, has been broadened to include used rail used for any purpose other than scrap or rerolling.

New Ceiling Prices Set For Reconditioned Drums

New ceiling prices for all sales of reconditioned, unused steel drums, pails and containers have been announced by the Office of Price Administration. The new ceiling prices are the same as those provided for used drums and other used steel shipping packages. Dollar-and-cents ceiling prices have been established for damaged new drums and used drums from 13 to 65 gallons in size and for pails in sizes from 1 to 12 gallons.

Maximum Prices for Cast Iron Soil Pipe Increased

Manufacturers' and jobbers' maximum prices for cast iron soil pipe and fittings have been increased about 4 per cent by the Office of Price Administration. Amendment 4 to revised price schedule 100 provides for an increase of $3 per ton in the prices of cast iron soil pipe and fittings. This increase is authorized, however, for a period of only six months during which a detailed study will be made to determine the action necessary to insure generally fair and equitable maximum prices for these products.

British Steel Not Slated For Early Nationalization

(*Concluded from Page 77*)

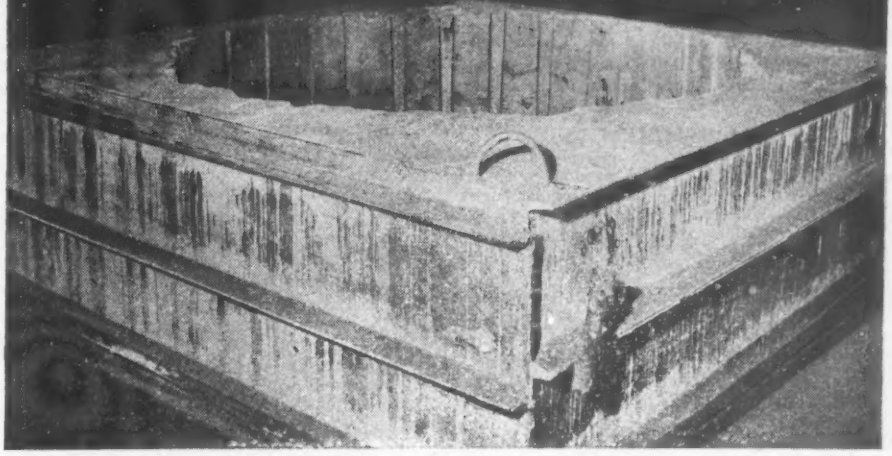
to give continuous employment and a better standard of life to the workers depending upon the industry, it would be necessary to attain a substantially higher output of iron and steel, and produce enough to replace imported products to the extent of 2 million tons a year. It was suggested that the necessary production could be carried out in one or two completely integrated plants.

Now the Labor party is in power, and it must face squarely all the difficulties that beset the putting into effect of their theories in regard to nationalization of a most complex industry. Small wonder if they hesitate before taking the responsibility for such a revolutionary move. The industry, on the other hand, has confidence in its capacity to solve its own problems. It is determined to pursue its plan, although handicapped now in regard to the supply of the necessary capital, for it is only too easy to understand that there will be hesitancy in investing fresh capital in an industry that lies under the threat of being taken over by the state, especially when the rate of compensation is unknown. The proposed state planning of investment brings in another element of uncertainty.

From the government's declaration of policy for the coming session of Parliament, there appears to be a breathing space, during which the new party leaders now in power may think over the pros and cons of the situation. The industry is strongly organized to expound its views and discuss the position in a friendly manner with the government. The British Iron & Steel Federation will exert every effort to persuade the government of the industry's confidence that it can manage itself, and, if no basis of agreement can be found, they will use all means at their disposal, mainly through Parliamentary opposition and public opinion, to win their case.

There remains the hopeful possibility of intelligent co-operation between government and industry, with a certain amount of give and take on both sides. Whatever solution is ultimately arrived at, it should be remembered that the consumer has a say in the matter, and should be directly represented in any discussions that may take place at the highest levels, so that his interest may also be protected.

STEEL FOUNDRIES USE REFRACTORY CONCRETE FOR *PERMANENT* MOLDS



Here's a permanent flask or mold ready for your next job. The amount of sand-molding required for big castings is reduced to a minimum. The solid, substantial Refractory Concrete section will take a lot of abuse in ramming and cleaning.

The flask is permanent because it stands up under heat, does not go to pieces, even when there's a breakthrough in the sand mold. The Refractory Concrete, made with LUMNITE and trap-rock, is cast in place and has full service strength in 24 hours without prefiring or baking.

Refractory Concrete is designed to meet the specific requirements of each installation. Thermal and insulating properties depend on the aggregate...crushed firebrick, trap rock, high-temperature insulating materials...used with LUMNITE. Aggregate and LUMNITE are mixed with water and cast in place. Result—jointless refractory sections of the right size and shape to fit the job.

Find out how you can use *adaptable* Refractory Concrete. Ask for booklet, "LUMNITE for Refractory Concrete." Write: The Atlas Lumnite Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, N.Y.

LUMNITE FOR REFRACTORY CONCRETE

CONSTRUCTION AND ENTERPRISE

ILLINOIS

CHICAGO—Monaco Metal Foundry Co., 114 West Hubbard St., has plans by H. M. McClure, 53 West Jackson Blvd., for a two-story 50 x 120-foot foundry addition to cost over $40 000.

ELGIN, ILL.—Elgin Softener Corp., manufacturer of water softening and purifying equipment, will build a one-story factory addition to cost about $50,000.

EL PASO, ILL.—City will issue $64,000 bonds for extending municipal water system, including water treatment plant, softener and engine drive unit.

LIBERTYVILLE, ILL.—Scale-Craft Co., manufacturer of railway model equipment, has let contract to Bulley & Andrews, 2040 West Harrison St., Chicago, for a one-story plant 120 x 160 feet.

JERSEYVILLE, ILL.—Baughman Mfg. Co., is building new plant for manufacture of lime spreaders, at cost of $125,000, with capacity of 20 machines daily.

MORRISON, ILL.—Liquid Carbonic Corp., 3100 South Kedzie Ave., Chicago, has let contract to Kaiser-Ducett Co., 80 East Jackson Blvd., Chicago, for a one-story and two-story plant to cost about $500,000.

OTTAWA, ILL.—Inland Rubber Co. plans early erection here of plant to cost about $250 000 for manufacture of tires and tubes. Plans are by Giffels & Vallet, 1000 Marquette Bldg., Detroit.

ST. CHARLES, ILL.—Howell Co., manufacturer of metal furniture, will build a one-story plant addition costing about $75.-000. Frank B. Gray, Geneva, Ill., is architect.

MASSACHUSETTS

WORCESTER, MASS.—Crompton & Knowles Loom Works, 93 Grand St., has let contract to E. Whitehead Inc., 97 Union St., for plant additions and alterations costing about $100,000.

CONNECTICUT

BRIDGEPORT, CONN.—Bryant Electric Co., H. E. Seim, president, 1421 State St., plans a three-story plant to cost about $650,000.

HARTFORD, CONN.—Spencer Turbine Co., 486 New Park Ave., has let contract to Louis W. Slocum Inc., 261 North Main street, West Hartford, for a one-story 85 x 135-foot plant addition, to cost about $50,000. R. J. Percival, 12 Haynes St., is architect.

STRATFORD, CONN.—Raybestos Division of Raybestos-Manhattan Inc., East Main St., has plans by L. Asheim, 211 State St., for a three-story factory and office building costing $85,000.

WALLINGFORD, CONN.—American Cyanamid Corp., 30 Rockefeller Plaza, New York, will take bids soon for additions and alterations to chemical plant at cost of about $300,000.

NEW YORK

BUFFALO—Dousing & Hunt Inc., Leon F. Dousing, president, will build an addition to its steel door plant. Plant is busy on post-war stampings and sheet metal products.

NORTH TONAWANDA, N. Y.—Rudolph Wurlitzer Co. plans a $1 million expansion to increase manufacturing floor space more than 250,000 square feet.

TICONDEROGA, N. Y.—International Paper Co., 220 East 42nd St., New York 17, will take bids soon on a boiler plant costing $265,000. Gibbs & Hill Inc., 450 Seventh avenue, New York, is engineer.

OHIO

AKRON—Rogers Tool & Die Co., 590 North Main St., has incorporated with $500 capital and 250 shares no par value to manufacture tools, jigs, dies, saws, pressed parts etc. Saul Groff, 113 South Main St., is agent.

CANTON, O.—Timken Roller Bearing Co., 1835 Dueber Ave., will build a two story plant adjacent to present office building on Dueber Ave., estimated to cost $350,600.

CLEVELAND — Lorence Plating Co., 3134 East 91st St., will build a one-story plant addition 72 x 130 feet, to cost $30,000.

DAYTON, O.—Chrysler Corp. Airtemp Division, General Motors Bldg., Detroit, has plans by Albert Kahn Associated Architects & Engineers Inc., 345 New Center Bldg., Detroit, for a plant to manufacture heating, air conditioning and refrigerating equipment, to cost about $3 million.

ELYRIA, O.—General Motors Corp., Detroit has bought 175 acres on the New York Central tracks near Elyria and will build a manufacturing plant with 400,000 square feet of floor space and an administration building. Hub caps, bumper guards, grilles and similar products will be manufactured.

LOUDONVILLE, O.—Flexible Co., Hugo H. Young, president, will build extension of plant B, Market St., 180 x 200 feet, for building of buses.

MICHIGAN

BRIGHTON, MICH.—Vagabond Coach Mfg. Co., has bought site for a new manufacturing plant.

KALAMAZOO, MICH.—Kalamazoo Stove & Furnace Co. plans to expend $2 million in retooling for postwar production. Arthur L. Black is president.

LANSING, MICH.—Phillips Bros. Screw Products Co. is building a one-story plant addition 40 x 80 feet, on South Logan St.

STEVENSVILLE, MICH.—St. Joe Machines Inc., St. Joseph, Mich., manufacturer of stapling machines, etc., has started erection of a plant here.

INDIANA

FORT WAYNE, IND.—Phelps-Dodge Copper Products Corp., New York, has bought 31 acres and will build a rod, wire and cable plant costing $4,500,000.

MISSISSIPPI

JACKSON, MISS.—Tri-State Brick & Tile Co. plans new plant with modern equipment, including continuous kiln, with capacity of 750,000 brick per month, to cost about $75,000.

TENNESSEE

JACKSON, TENN.—Kirby-Williams Steel Co., John Williams, president, plans a one-story factory to cost about $40,000.

NASHVILLE, TENN.—Precision Parts Corp. is building a one-story machine shop 97 x 150 feet at 402 Cowan St.

NORTH CAROLINA

NEW BERN, N. C.—City will build diesel engine power plant adjoining present steam plant. Burns & McDonnell, Kansas City, Mo.,

MISSOURI

INDEPENDENCE, MO. — Alexander Klein plans one-story factory 40 x 200 feet for manufacture of deep-freeze units.

KANSAS CITY, MO.—Loose-Wiles Biscuit Co., 1100 West Eighth St., Hanford Main, president, has bought 44 acres in Fairfax Industrial District for a $3 million plant, first unit with three work floors 400 x 1400 feet B. Steenhof is plant manager.

KANSAS CITY, MO. — Nevel Mfg. Co., manufacturer of metal folding chairs, suitcases, etc., plans a two-story plant addition 60 x 65 feet, at 1437 Chestnut St.

ST. LOUIS—Emerson Electric Mfg. Co., 1864 Washington St., plans a new factory to cost about $1 million.

ST. LOUIS—Missouri Pacific railroad has let contract to H. B. Deal & Co. Inc., 1218 Olive St., for a one-story 50 x 90-foot machine shop at 3001 Chouteau Ave.

ST. LOUIS—Barry-Wehmiller Machinery Co., 4660 West Florissant Ave., manufacturer of food processing equipment, plans a two-story plant 130 x 260 feet, to cost about $250,000 with equipment. Oscar Janssen, Chemical Bldg., 721 Olive St., St. Louis, is architect.

ST. LOUIS—Acme Chair Co., 3801 Washington Ave., has let contract to Murch-Jarvis Co. Inc., 718 Locust St., for a one-story 80 x 105-foot plant at 3232 Washington Ave. O. R. S. Traber, 718 Locust St., is architect. Cost is estimated at $40,000.

WISCONSIN

BURLINGTON, WIS.—Burlington Mills Inc., manufacturer of insulation, plans one-story plant addition 66 x 106 feet.

HARTFORD, WIS.—Maysteel Products Inc., Mayville, Wis., plans a one-story 60 x 160-foot plant.

KENOSHA, WIS.—Wells Machine Co. has let contracts for a one-story factory addition.

LA CROSSE, WIS.—Trane Co., manufacturer of heating and air conditioning equipment, has let contract to the Austin Co., 510 North Dearborn St., Chicago, for a one-story plant addition at Bennett and 16th Sts.

MILWAUKEE—S. K. Williams Co., electroplater, will let contracts soon for a one-story plant 58 x 144 feet, at 2328 North 31st St.

MILWAUKEE—Peterson Tool & Machine Co. has let contract for a one-story machine shop 60 x 185 and 20 x 30 feet, at 2455 West Clybourn street.

MILWAUKEE—Graham Transmissions Inc., manufacturer of variable speed transmissions, will let contracts soon for a two-story addition to its machine shop, 30 x 120 feet, at 3760 North Holton St.

MILWAUKEE—Midwest Die Casting Co., 3930 North First St., has let contracts for a one-story plant addition.

MILWAUKEE—Wesley Steel Treating Co. is having plans made for a one-story plant addition 33 x 96 feet at 1333 West Pierce St.

MILWAUKEE—Weyenberg Shoe Mfg. Co., 234 East Reservoir Ave., has let contract to Walter W. Oeflein Inc., for a three-story plant addition 140 x 202 feet.

MILWAUKEE—Micron Tool & Machine Co., 2030 North 35th St., has let contract for a one-story machine shop addition.

RACINE, WIS.—Dremel Mfg. Co., manufacturer of grinders, plans a one-story plant.

SUPERIOR, WIS.—City plans construction of sewage disposal plant to cost about $500,000. R. E. McKeague is city clerk.

SOUTH MILWAUKEE, WIS.—Midland Co., manufacturer of hardware and metal specialties, has let contracts for a plant addition 128 x 128 feet.

WAUSAU, WIS.—Worth Co., manufacturer of metal parts and fishing tackle, Stevens Point, Wis., plans a one-story factory 200 x 200 feet. A. F. Billmeyer & Son, Wisconsin Rapids, are architects.

MINNESOTA

MINNEAPOLIS—Storm Mfg. Co., 1312 South Fifth street, manufacturer of boring machines for automotive maintenance, plans a one-story plant addition.

MINNEAPOLIS, MINN.—American Refrigerator & Machine Inc., 615 North Third St., manufacturer of refrigerating equipment, will build a one-story plant at 2700 Uni-

versity Ave. Northeast, 140 x 162 feet.

MOORHEAD, MINN.— City water and light commission will open bids Sept. 18 for a 55,000-lb capacity boiler, 3000-kw generator, stoker and auxiliary equipment for the municipal light and power plant, following approval of $712,000 improvement program. Helmick, Edeskuty & Lutz, Essex building, Minneapolis, are engineers.

ST. CLOUD, MINN.—J. P. Fox has bought the Midland Hardware Foundry and will reopen it for manufacture of boat anchors and aluminum castings.

ST. PAUL—National Battery Co., First National Bank Bldg., has bought eight acres at Lexington Ave., and Hewitt St., as site for a new plant. A. H. Daggett is president.

ST. PAUL—Highway Safety Appliances Inc., 2429 University Ave., manufacturer of antiskid devices, has bought site for factory, first unit to cost about $125,000.

ST PAUL—Atlas Mfg. Co., Eustis and Robbins Sts., manufacturer of sheet metal products, has let contract to E. O. Myrman for a one-story plant addition 60 x 80 feet.

ST. PAUL—St. Paul Welding & Mfg. Co., 292 Walnut St., manufacturer of welding equipment, has let contract to Lauer Construction Co. for a one-story plant 53 x 60 feet.

ST. PAUL—Healy-Ruff Co., 2235 University Ave., manufacturer of water level control equipment, radiator hangers, concrete inserts, etc., has let contracts for remodeling and addition to foundry at 85 West Water St.

ST. PAUL—Seeger Sunbeam Corp., manufacturer of refrigerators, has let contract for a two-story plant 76 x 90 feet.

NEBRASKA

BEATRICE, NEBR.—Store Kraft Mfg. Co., manufacturer of store fixtures and cases, has let contract to Olsen Construction Co., Lincoln, Nebr., for a one-story plant addition 75 x 225 feet, to cost about $100,000.

IOWA

DAVENPORT, IOWA—French & Hecht Inc., division of Kelsey-Hayes Wheel Co., 523 East Third St., has let contract to Priester Construction Co., Davenport Bank Bldg., for plant additions and remodeling, to cost about $400,000.

GRINNELL, IOWA—Grinnell College will build a foundry at cost of $60,000, to be operated by Lennox Furnace Co., Marshalltown, Iowa, manufacturer of heating products. Lenox plant will absorb most of the foundry output.

OTTUMWA, IOWA—Clausing Mfg. Co., manufacturer of lathes and tools plans a one-story plant 120 x 180 feet. Paul Clausing is manager.

WEBSTER CITY, IOWA—Charles Closz Co., manufacturer of threshing machine parts, etc., will build a one-story plant 100 x 300 feet.

CALIFORNIA

CLEARWATER, CALIF.—Capital Welding Co. has let contract to William J. Moran Co., 1011 South Fremont Ave., Los Angeles, for a plant building 60 x 80 feet at 1201 West Rosecrans Ave., in suburban Los Angeles, including 3-ton crane. Estimated to cost about $9000.

LOS ANGELES—Coast Coil Spring Co. has permit for building a machine shop at 123 East 58th St., 120 x 120 feet, to cost about $36,200.

LOS ANGELES—Columbia Iron & Metals Co. will build a storage building 62 x 75 feet at 718 East Slauson Ave.

LOS ANGELES—Paul Wagner is building a machine shop at 2875 Washington boulevard, 117 x 173 feet, to cost $40,000.

LOS ANGELES—Roberts Tackless Strip Co., 4705 West Pico boulevard, has let contract to W. B. Whisenand, 357 South Spring St., for a factory building at 123 South Boyle Ave., 50 x 80 feet, to cost about $12,000.

SAN DIEGO, CALIF.—Aircraft Engineering Corp. has been incorporated with $75,000 capital, by G. R. Halterman and associates. Eugene Glenn, 520 Bank of America bldg., San Diego, is representative.

OAKLAND, CALIF.—Diamond Precision Motor Parts has been incorporated with $100,000 capital, represented by Hagar, Crosby & Crosby, Central Bank Bldg., Oakland.

PASADENA, CALIF.—Holly Heating & Mfg. Co., 1000 Fair Oaks Ave., South Pasadena, has plans for a plant at 861 South Arroyo Parkway Boul., 140 x 157 feet, to cost about $52,000. Plans are by R. Howard Annin, 405 South Hill St., Los Angeles.

VAN NUYS, CALIF.—Ed Price has let contract to Owens-Holloway, 14519 Van Owen St., for a machine shop 20 x 60 feet, to cost about $4000.

VERNON, CALIF.—Studebaker Pacific Corp., 4530 Loma Vista, will build a plant addition and improve office building, at cost of $11,000.

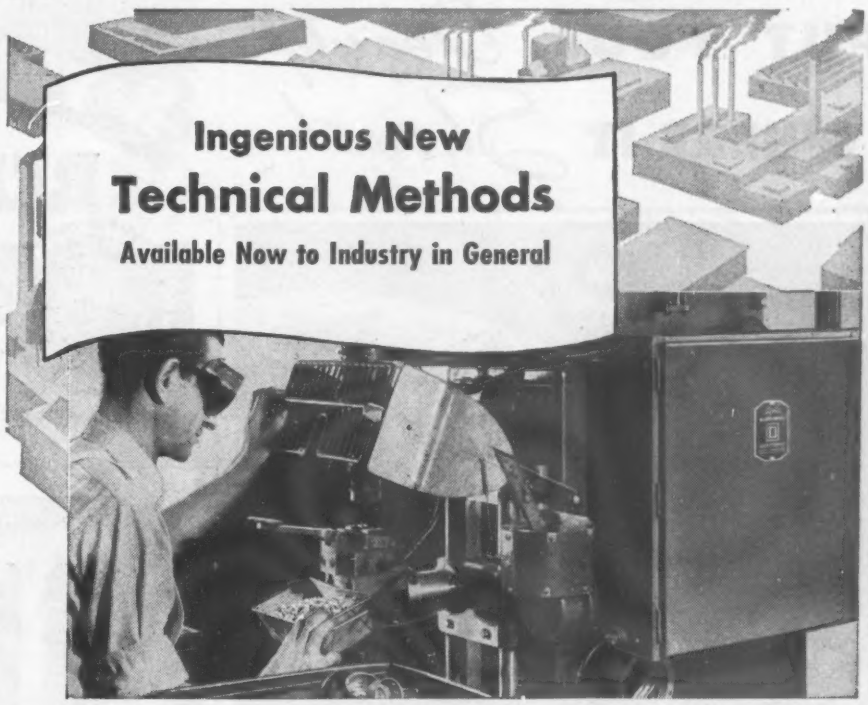
VERNON, CALIF.—Truck Bodies Co. is erecting a plant building 51 x 80 feet on East 26th St., at cost of $19,000.

VENICE, CALIF.—Flexible Sewer Rod & Equipment Co., 9059 Venice boulevard, is building a plant addition 50 x 150 feet, to cost about $20,000.

OREGON

EUGENE, OREG.—International Crossarm Co. has bought ten acres for factory to cost about $600,000, with equipment.

SALEM, OREG.—American Can Co. has bought 28 acres for site of can manufacturing plant.



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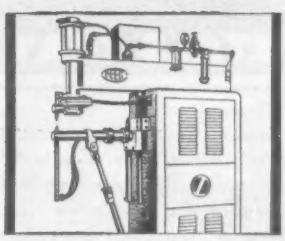

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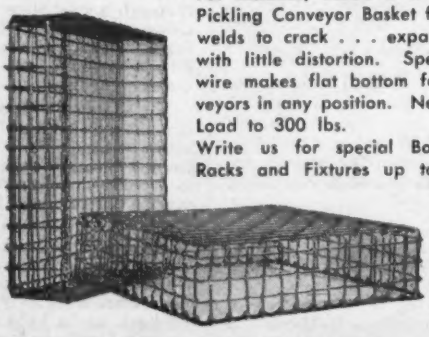

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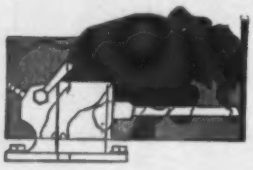

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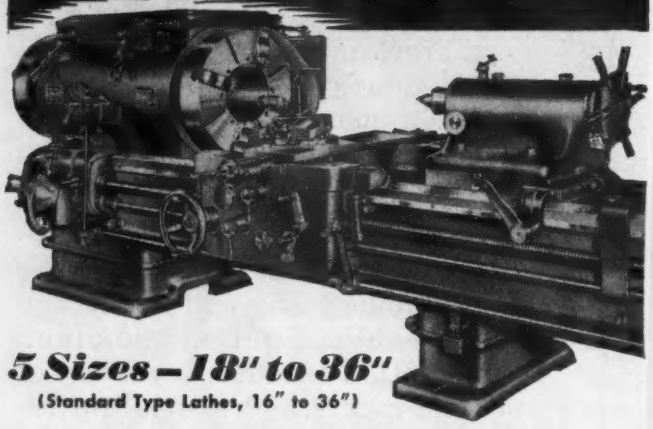

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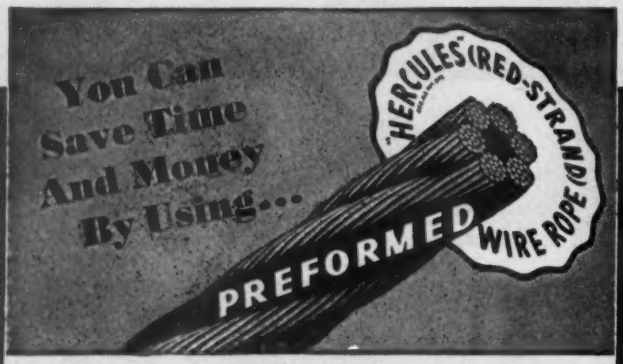

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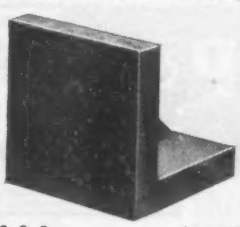

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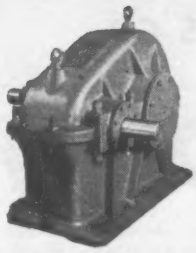

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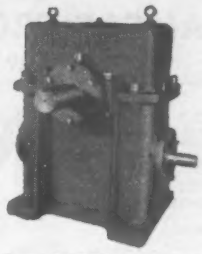
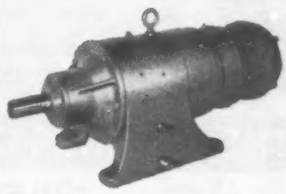


Type "H" Worm Gear Speed Reducers

Planetary Gear Speed Reducers



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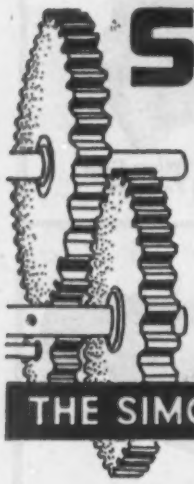

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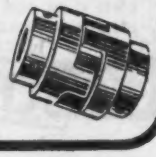

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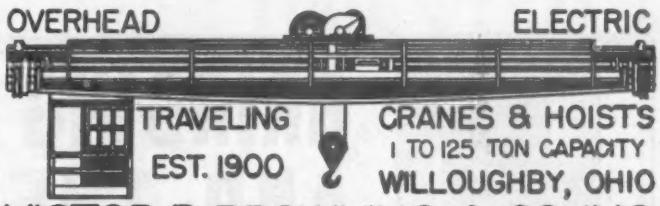

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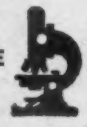

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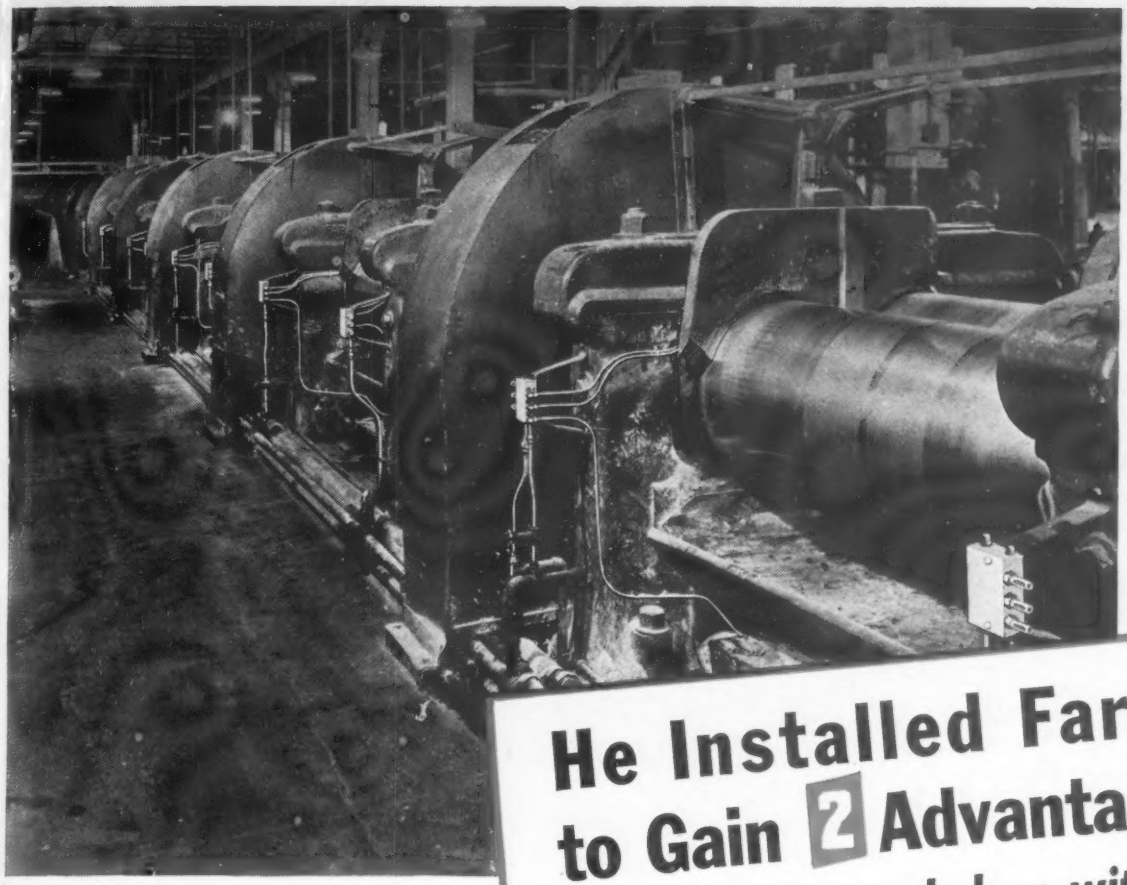

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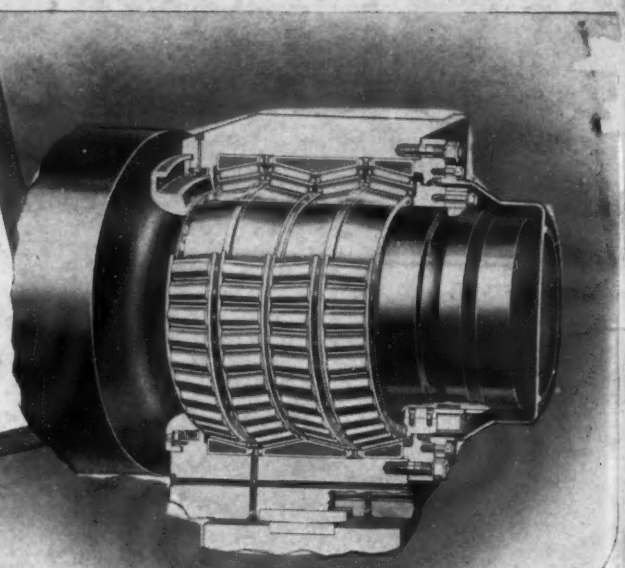

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